United States Department of Agriculture,
Natural Resources Conservation Service
and Forest Service

In cooperation with
United States Department of the Interior,
Bureau of Indian Affairs and
Bureau of Land Management, and
Montana Agricultural Experiment Station

Soil Survey of Missoula County Area, Montana

Part I

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, which is the color map preceding the detailed soil maps, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your general area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

The **detailed soil maps** follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** in Part I of this survey, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

A **State Soil Geographic Data Base (STATSGO)** is available for this survey area. This data base consists of a soils map at a scale of 1 to 250,000 and descriptions of groups of associated soils. It replaces the general soil map published in older soil surveys. The map and the data base can be used for multicounty planning, and map output can be tailored for a specific use. More information about the State Soil Geographic Data Base for this survey area, or any portion of Montana, is available at the local office of the Natural Resources Conservation Service.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service and Forest Service; the United States Department of the Interior, Bureau of Land Management and Bureau of Indian Affairs; and the Montana Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Missoula County Conservation District. Financial assistance was provided by the Forest Service, the Champion International Corporation, and the Missoula County Commissioners in cooperation with the Missoula County Conservation District, the Bureau of Land Management, the Montana Department of State Lands, and the Burlington Northern Corporation.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Areas of Repp very gravelly loam are mainly on the high mountains in the background. These soils formed in colluvium derived from argillite and limestone. Winkler very gravelly sandy loam and Winkler gravelly loam are mainly in the forested areas on the mountains. These soils formed in colluvium derived from quartzite and argillite. Areas of Half Moon silt loam, which formed in glaciolacustrine deposits from ancient Glacial Lake Missoula, are in the foreground.

Contents

Part I

Index to taxonomic units iv
Index to map units v
Summary of tables ix
Foreword xi
How this survey was made 1
General nature of the survey area 2
History 2
Transportation facilities 3
Drainage and physiography 3
General geology and geologic formation 4
Climate 4
General soil map units 9
Map unit descriptions 9
Formation and classification of the soils 15
Soil series and detailed soil map units 23
References 135
Glossary 137

Part II

Detailed soil map unit legend v
Summary of tables viii
Agronomy 7
Cropland limitations and hazards 7
Crop yield estimates 8
Land capability classification 9
Prime farmland and other important farmland 10
Erosion factors 11
Windbreaks and environmental plantings 11
Range 39
Range condition 40
Rangeland management 40
Forest land understory vegetation 41
Forest land 71
Woodland ordination system 72
Forest land management and productivity 73
Recreation 103
Wildlife habitat 119
Elements of wildlife habitat 119
Kinds of wildlife habitat 119
Wildlife in the Missoula County area 120
Engineering 123
Building site development 123
Sanitary facilities 124
Waste management 125
Construction materials 126
Water management 127
Soil properties 185
Engineering index properties 185
Physical and chemical properties 186
Water features 188
Soil features 189
References 285
Glossary 287

Issued November 1995

Index to Taxonomic Units

Alberton series.......... 24
Ambrant series.......... 25
Aquepts.......... 27
Aquic Haploxerolls.......... 27
Aquic Udorthents.......... 28
Aquolls.......... 29
Argixerolls.......... 30
Auggie series.......... 32
Bata series.......... 33
Beeskove series.......... 35
Bigarm series.......... 37
Biglake series.......... 40
Bignell series.......... 41
Borohemists.......... 44
Chickaman series.......... 44
Coerock series.......... 46
Courville series.......... 47
Crow series.......... 49
Desmet series.......... 51
Elkner series.......... 52
Evaro series.......... 53
Felan series.......... 55
Glaciercreek series.......... 58
Glaciercreek variant.......... 59
Grantsdale series.......... 60
Grassvalley series.......... 61
Greenough series.......... 64
Hagstadt series.......... 65
Half Moon series.......... 66
Hanaker series.......... 67
Haploxerolls.......... 68
Hollandlake series.......... 69
Holloway series.......... 71
Jimlake series.......... 74
Lantern series.......... 76
Lolopeak series.......... 79
Lubrecht series.......... 80
Mitten series.......... 82
Moiese series.......... 84
Orthents.......... 85
Ovando series.......... 86
Perma series.......... 87
Perma variant.......... 89
Petty series.......... 91
Phillcher series.......... 95
Repp series.......... 96
Rochester series.......... 99
Rumblecreek series.......... 100
Selway series.......... 101
Sharrott series.......... 104
Shooflin series.......... 105
Tally variant.......... 106
Tevis series.......... 107
Totelake series.......... 110
Trapps series.......... 112
Turrah series.......... 113
Udifluvents.......... 115
Udorthents.......... 115
Upsata series.......... 116
Waldbillig series.......... 118
Whitore series.......... 122
Wildgen series.......... 124
Winfall series.......... 127
Winkler series.......... 128
Xerofluvents.......... 132
Yourame series.......... 133

Index to Map Units

1—Alberton very fine sandy loam, 0 to 2 percent slopes.... 25
2—Ambrant gravelly sandy loam, 15 to 30 percent slopes.... 26
3—Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes.... 26
4—Aquic Haploxerolls, 0 to 2 percent slopes.... 28
5—Aquic Udorthents, 0 to 2 percent slopes.... 28
6—Aquolls and Aquepts, 0 to 2 percent slopes.... 29
7—Argixerolls-Haploxerolls complex, 0 to 4 percent slopes.... 30
8—Argixerolls-Haploxerolls complex, 4 to 15 percent slopes.... 31
9—Argixerolls-Haploxerolls complex, 15 to 30 percent slopes.... 31
10—Argixerolls-Haploxerolls complex, 30 to 60 percent slopes.... 32
11—Auggie silt loam, 4 to 15 percent slopes.... 33
12—Bata gravelly silt loam, cool, 2 to 8 percent slopes.... 34
13—Bata-Waldbillig gravelly silt loams, 4 to 30 percent slopes.... 34
14—Beeskove gravelly loam, 30 to 60 percent slopes.... 36
15—Beeskove-Rock outcrop complex, 50 to 80 percent slopes.... 36
16—Bigarm gravelly loam, 0 to 4 percent slopes.... 38
17—Bigarm gravelly loam, 4 to 15 percent slopes.... 38
18—Bigarm gravelly loam, 15 to 30 percent slopes.... 38
19—Bigarm gravelly loam, 30 to 60 percent slopes.... 39
20—Bigarm-Rock outcrop complex, 30 to 60 percent slopes.... 39
21—Biglake gravelly sandy loam, 8 to 15 percent slopes.... 40
22—Biglake gravelly sandy loam, 15 to 30 percent slopes.... 41
23—Bignell gravelly loam, 8 to 30 percent slopes.... 42
24—Bignell-Winkler, cool, complex, 30 to 60 percent slopes.... 42
25—Bignell, warm-Winkler complex, 30 to 60 percent slopes.... 43
26—Borohemists, 0 to 2 percent slopes.... 44
27—Chickaman silt loam, 8 to 30 percent slopes.... 45
28—Chickaman silt loam, 30 to 60 percent slopes.... 46
29—Coerock-Rock outcrop complex, 4 to 30 percent slopes.... 47
30—Coerock-Rock outcrop complex, 50 to 80 percent slopes.... 47
31—Courville gravelly silt loam, 8 to 30 percent slopes.... 48
32—Courville-Mitten gravelly silt loams, 30 to 60 percent slopes.... 49
33—Crow silt loam, 4 to 15 percent slopes.... 50
34—Desmet loam, 0 to 2 percent slopes.... 51
35—Elkner-Ovando complex, 8 to 30 percent slopes.... 53
36—Evaro gravelly loam, 8 to 30 percent slopes.... 54
37—Evaro gravelly loam, 30 to 60 percent slopes.... 54
38—Felan gravelly silt loam, 8 to 30 percent slopes.... 56
39—Felan gravelly silt loam, 30 to 60 percent slopes.... 56
40—Felan gravelly silt loam, cool, 8 to 30 percent slopes.... 57
41—Felan gravelly silt loam, cool, 30 to 60 percent slopes.... 57
42—Glaciercreek gravelly silt loam, 0 to 4 percent slopes.... 58
43—Glaciercreek variant-Glaciercreek complex, 4 to 20 percent slopes.... 59
44—Grantsdale loam, 0 to 2 percent slopes.... 61

45—Grassvalley silty clay loam, 0 to 4 percent slopes.................................... 62
46—Grassvalley silty clay loam, 4 to 8 percent slopes.................................... 62
47—Grassvalley silty clay loam, 8 to 15 percent slopes.................................... 63
48—Grassvalley silty clay loam, 15 to 30 percent slopes.................................... 63
49—Greenough silt loam, 4 to 15 percent slopes.................................... 64
50—Hagstadt silt loam, 4 to 25 percent slopes...... 65
51—Half Moon silt loam, 4 to 8 percent slopes...... 67
52—Hanaker silt loam, 0 to 6 percent slopes 68
53—Hollandlake gravelly loam, 4 to 30 percent slopes.................................... 70
54—Hollandlake-Bata complex, 4 to 30 percent slopes.................................... 70
55—Hollandlake-Bata complex, 30 to 60 percent slopes.................................... 71
56—Holloway gravelly silt loam, 8 to 30 percent slopes.................................... 72
57—Holloway gravelly silt loam, 30 to 60 percent slopes.................................... 73
58—Holloway gravelly silt loam, cool, 8 to 30 percent slopes 73
59—Holloway gravelly silt loam, cool, 30 to 60 percent slopes 73
60—Holloway-Rock outcrop complex, 50 to 80 percent slopes 74
61—Jimlake gravelly silt loam, 4 to 30 percent slopes.................................... 76
62—Jimlake gravelly silt loam, 30 to 60 percent slopes.................................... 76
63—Lantern gravelly sandy loam, 8 to 30 percent slopes.................................... 77
64—Lantern gravelly sandy loam, 30 to 60 percent slopes 78
65—Lantern-Rock outcrop complex, 50 to 80 percent slopes 78
66—Lolopeak bouldery loam, 50 to 80 percent slopes.................................... 79
67—Lolopeak-Rock outcrop complex, 50 to 80 percent slopes 80
68—Lubrecht silt loam, 4 to 15 percent slopes 81
69—Mitten gravelly silt loam, 30 to 60 percent slopes.................................... 83
70—Mitten-Sharrott, cool, complex, 15 to 40 percent slopes 83
71—Mitten-Tevis complex, 30 to 60 percent slopes.................................... 84
72—Moiese gravelly loam, 0 to 2 percent slopes.................................... 85
73—Orthents, 0 to 4 percent slopes................ 86
74—Ovando-Elkner-Rock outcrop complex, 30 to 60 percent slopes 87
75—Perma gravelly loam, 0 to 4 percent slopes.................................... 88
76—Perma gravelly loam, 20 to 45 percent slopes.................................... 89
77—Perma stony loam, 2 to 12 percent slopes...... 89
78—Perma variant stony silt loam, 2 to 8 percent slopes.................................... 90
79—Perma variant-Perma complex, 4 to 30 percent slopes 91
80—Petty gravelly loam, 8 to 30 percent slopes.................................... 92
81—Petty gravelly loam, 30 to 60 percent slopes.................................... 93
82—Petty bouldery loam, 30 to 60 percent slopes.................................... 93
83—Petty gravelly loam, cool, 8 to 30 percent slopes.................................... 93
84—Petty bouldery loam, cool, 50 to 80 percent slopes.................................... 94
85—Petty, cool-Rock outcrop complex, 50 to 80 percent slopes 94
86—Phillcher silt loam, 4 to 30 percent slopes.................................... 95

87—Phillcher-Rock outcrop complex, 50 to 80 percent slopes 96
88—Pits, gravel 96
89—Repp very gravelly loam, 30 to 60 percent slopes 97
90—Repp very gravelly loam, cool, 8 to 30 percent slopes 98
91—Repp very gravelly loam, cool, 30 to 60 percent slopes 98
92—Repp-Rock outcrop complex, 50 to 80 percent slopes 99
93—Riverwash 99
94—Rock outcrop-Rubble land complex 100
95—Rumblecreek gravelly loam, 4 to 30 percent slopes 101
96—Selway gravelly sandy loam, 8 to 30 percent slopes 102
97—Selway gravelly sandy loam, 30 to 60 percent slopes 103
98—Selway bouldery sandy loam, 30 to 60 percent slopes 103
99—Sharrott-Rock outcrop complex, 4 to 30 percent slopes 104
100—Shooflin silt loam, 4 to 15 percent slopes 106
101—Tally variant sandy loam, 0 to 4 percent slopes 107
102—Tevis gravelly loam, 30 to 60 percent slopes 108
103—Tevis-Mitten complex, 8 to 30 percent slopes 108
104—Tevis-Mitten-Rock outcrop complex, 45 to 70 percent slopes 109
105—Totelake gravelly loam, 2 to 8 percent slopes 110
106—Totelake gravelly loam, 8 to 30 percent slopes 111
107—Totelake extremely stony loam, 2 to 8 percent slopes 111
108—Trapps gravelly loam, 8 to 30 percent slopes 112
109—Trapps gravelly loam, 30 to 60 percent slopes 113
110—Turrah silty clay loam, 0 to 2 percent slopes 114
111—Udifluvents, 0 to 2 percent slopes 115
112—Udorthents-Glaciercreek complex, 0 to 8 percent slopes 116
113—Upsata gravelly fine sandy loam, 2 to 8 percent slopes 117
114—Urban land 117
115—Waldbillig gravelly silt loam, 4 to 30 percent slopes 118
116—Waldbillig gravelly silt loam, 30 to 60 percent slopes 119
117—Waldbillig-Auggie complex, 4 to 15 percent slopes 119
118—Waldbillig-Holloway gravelly silt loams, 8 to 30 percent slopes 120
119—Waldbillig-Holloway gravelly silt loams, 30 to 60 percent slopes 120
120—Waldbillig-Holloway gravelly silt loams, cool, 8 to 30 percent slopes 121
121—Waldbillig-Holloway gravelly silt loams, cool, 30 to 60 percent slopes 121
W—Water 122
122—Whitore gravelly clay loam, 8 to 30 percent slopes 123
123—Whitore gravelly clay loam, 30 to 60 percent slopes 123
124—Wildgen gravelly loam, 4 to 30 percent slopes 124
125—Wildgen-Winkler, cool, gravelly loams, 15 to 30 percent slopes 125
126—Wildgen-Winkler, cool, gravelly loams, 30 to 60 percent slopes 125
127—Wildgen, dry-Winkler complex, 15 to 30 percent slopes 126
128—Wildgen, dry-Winkler complex, 30 to 60 percent slopes 127

129—Winfall gravelly loam, 4 to 30 percent slopes 128
130—Winkler very gravelly sandy loam, 8 to 30 percent slopes 129
131—Winkler very gravelly sandy loam, 30 to 60 percent slopes 130
132—Winkler gravelly loam, cool, 8 to 30 percent slopes 130
133—Winkler gravelly loam, cool, 30 to 60 percent slopes 131
134—Winkler-Rubble land complex, 50 to 80 percent slopes 131
135—Winkler, cool-Rock outcrop complex, 50 to 80 percent slopes 131
136—Xerofluvents, 0 to 2 percent slopes 132
137—Yourame gravelly loam, 4 to 30 percent slopes 134

Summary of Tables

Part I

Temperature and precipitation 5

Freeze dates in spring and fall 7

Growing season 8

Classification of the soils 18

Acreage and proportionate extent of the soils 20

Part II (For page numbers, see "Summary of Tables" in Part II)

Classification of the soils

Acreage and proportionate extent of the soils

Main cropland limitations and hazards

Land capability and yields per acre of crops and pasture

Prime farmland

Rangeland productivity and characteristic plant communities

Understory vegetation and habitat types

Forest land management

Forest land productivity

Main forest access road limitations and hazards

Recreational development

Building site development

Sanitary facilities

Construction materials
Water management
Engineering index properties
Physical properties of the soils
Chemical properties of the soils
Water features
Soil features

Foreword

This soil survey contains information that can be used in land-planning programs in the Missoula County Area, Montana. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of Missoula County Area, Montana

Fieldwork by Arial Anderson, Barry L. Dutton, W.D. Harrison, Harold E. Hunter, J.T. Parcell, Leon T. Stem, and David J. Trochlell, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service and Forest Service,
in cooperation with the United States Department of the Interior, Bureau of Indian Affairs and Bureau of Land Management, and the Montana Agricultural Experiment Station

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils

in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Nature of the Survey Area

The survey area is in the west-central part of Montana (fig. 1). The total land area is 1,281,500 acres, or 1,929 square miles. Missoula County is about 65 miles from the northern boundary to the southern boundary and is about 60 miles from the eastern to western boundaries. The elevation is approximately 3,200 feet above sea level at the city of Missoula and ranges from 3,000 feet in the western part of the survey area, along the Clark Fork River, to 9,356 feet on Holland Peak in the northeastern part.

History

The earliest inhabitants of the survey area were the Indians who camped in the summer while crossing the mountains to hunt buffalo. The Salish tribe occupied both sides of the Continental Divide until about the year 1700, when they were pushed westward by the Crow and Shoshone tribes.

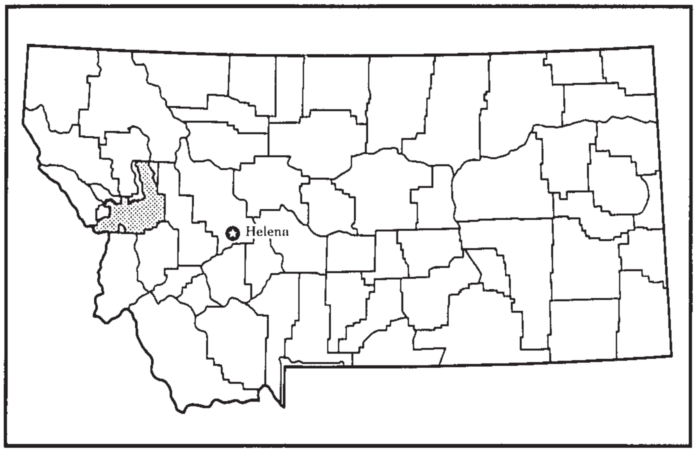

Figure 1.—Location of Missoula County Area in Montana.

In 1803, the Louisiana Purchase was negotiated with France. In 1805, Lewis and Clark began their trip through the Northwest to the Pacific Ocean. Members of the Lewis and Clark Expedition were the first Europeans documented in the area. They camped at the junction of Lolo Creek and the Bitterroot River on September 9, 1805, and they named the spot "Travellers-rest."

When the Oregon Territory was organized in 1843, it included western Montana. In December 1860, Missoula County was formed from part of Spokane County, which had been part of the Washington Territory. In 1863, Missoula County became part of the Idaho Territory. When the Montana Territory was organized in 1864, Missoula County came to include all the area west of the Continental Divide. It was one of the original nine counties in the Montana Territory.

On February 2, 1865, the Montana Territorial Legislature officially established Missoula County and named the town of Hellgate as the county seat. The original county had an area of approximately 25,250 square miles, or about 17 percent of the Montana Territory. Since then, Ravalli, Lake, Sanders, Granite, and Mineral Counties and parts of Flathead and Powell Counties have been formed from the original Missoula County.

The city of Missoula was established in 1865, when Worden and Company built a sawmill and grist mill at its present location. The new town was originally called Missoula Mills, but later the last word was dropped. In 1866, the county seat was moved from Hellgate to Missoula.

In 1883, the Northern Pacific railway was completed from Miles City to Missoula. It tied the survey area into the northwestern rail system. Until the railway was

completed, the closest outlet to eastern markets was about 275 miles away at Fort Benton on the Missouri River.

Montana was granted statehood in 1889. The University of Montana, located at Missoula, was established in 1895.

Once the railroad was completed as far west as Wallace, Idaho, logging in the survey area became a viable source of revenue. The railroad also provided an expanded market for agricultural products.

Shortly after the turn of the century, the agricultural industry began to expand rapidly. The first irrigation systems were constructed during this period. They proved that a variety of high-yield crops could be grown in areas where an adequate supply of irrigation water was available.

The population of Missoula County has increased in recent decades. In 1950, it was 35,493, but by 1992, it had grown to 82,416.

Transportation Facilities

The Missoula County area is served by several county, State, and Federal highways. One major railroad also serves the county. Modern bridges span the Clark Fork, Blackfoot, and Bitterroot Rivers at several locations. Airline passenger service, both commercial and general, is available in the survey area. Bus service is also available.

Drainage and Physiography

The Missoula County area is in the Northern Rocky Mountains. It is drained by the Clark Fork River and its principal drainageways, including the Bitterroot, Blackfoot, Clearwater, and Jocko Rivers and Ninemile Creek. Most of the Ninemile Creek drainageway, however, is outside the survey area.

The drainageways reflect a complex physiographic history. The Clark Fork River originates outside the survey area in the Silver Bow Mountains, about 18 miles southwest of Butte. It flows northward through the broad alluvium- and lakebed-filled Deer Lodge Valley for about 40 miles. Near Garrison, in Powell County, it abruptly turns to the northwest and flows through a relatively narrow, rock-cut valley in the eastern part of Missoula County. At Hellgate, near the city of Missoula, it flows through the wide, sediment-filled Missoula Valley for about 25 miles to the city of Huson. West of Huson, it flows through a narrow, rock-cut, gorgelike valley in the western part of Missoula County.

The Bitterroot River flows into Missoula County from the south and joins the Clark Fork River a short distance downstream from the city of Missoula. It flows through a wide, sediment-filled valley bounded by high mountains.

The Blackfoot River drains the northeastern part of Missoula County. It flows west across the wide Ovando-Helmville Valley to Clearwater Junction, where it joins its principal tributary, the Clearwater River. It then cuts through the mountains along a narrow, rock-cut canyon to join the Clark Fork River at Bonner, just east of Missoula.

Ninemile Creek drains the extreme northwestern part of Missoula County. It flows toward the southeast in a wide, sediment-laden valley separated by high mountain ridges. The southwestern ridge is known as Ninemile Divide; the northeastern ridge is not named. Ninemile Creek joins the Clark Fork River between the cities of Alberton and Huson.

The drainageways in Missoula County are generally bounded by the rugged mountain ranges that make up most of the land area.

The Garnet Range is in the eastern part of Missoula County. It rises 1,900 to 2,500 feet above the Clark Fork Valley, and the crest is between 5,414 and 6,800 feet above sea level.

The mountain range north of the Missoula Valley rises to an elevation of about 8,000 feet above sea level. North of this range, in the northern part of Missoula County, the rugged Mission and Swan Mountain Ranges rise to an elevation of nearly 10,000 feet above sea level.

The south-central part of Missoula County is bounded by the Sapphire Range. This range is south of the Clark Fork River and east of the Bitterroot River Valley. It rises 2,000 to more than 4,000 feet above the floor of the Bitterroot Valley, to an elevation of 5,000 to 7,000 feet above sea level.

The southwestern boundary of Missoula County is formed by the Bitterroot Range. This range is south of the Clark Fork Valley and west of the Bitterroot River Valley. It rises more than 6,000 feet above the valley floor. It commonly has high peaks that rise to an elevation of more than 9,000 feet above sea level.

The western and northwestern boundaries of Missoula County are formed by the Grave Creek Range and the Ninemile Range.

The mountainous areas south of the Blackfoot and Clark Fork Rivers have rounded crests and are dissected by narrow, steep-sided stream valleys that are cut in bedrock. On the higher, steeper slopes, rock outcrops are common.

The mountainous areas north of the Clark Fork and Blackfoot Rivers have been glaciated. They include the mountains north of the Missoula Valley, the Mission and Swan Ranges, the Clearwater drainageway and Clearwater Valley, and the Swan Valley. A small area of the Bitterroot Mountains was also glaciated along the border with Idaho.

During the Pleistocene stages of glaciation, the Cordillerian ice sheet dammed the mouth of the gorges of the Clark Fork River near the Idaho border. The ice formed a dam about 2,000 feet high that backed up water and formed Glacial Lake Missoula. The lake extended into Missoula County and reached a maximum elevation of about 4,200 feet above sea level, or about 1,000 feet above the present elevation of the city of Missoula. Deposits from the lakebed consist principally of silty material and fine sand. Although much of the sediment has eroded, areas of these deposits are exposed along the Clark Fork River.

General Geology and Geologic Formation

The survey area has had a long and complex geologic history, which has resulted in a variety of rock types that were acted upon by many geomorphic processes. These rocks range in age from Precambrian, or Beltian, to recent. All of the Mesozoic sedimentary sections are missing, however. Paleozoic rocks are exposed only in the Garnet Range and in two small areas in the western part of the survey area. Most of the soils in mountainous areas are underlain by Beltian sediment. In the southeastern part of Missoula County, Beltian and Paleozoic rocks are intruded by granodiorite. Some Tertiary volcanic rock occurs locally. The major valleys in the survey area are filled with Tertiary lakebed sediment, Pleistocene silt from Glacial Lake Missoula, and recent alluvium. Pleistocene glacial deposits are in the Clearwater, Swan, and Blackfoot River drainageways.

Precambrian deposition.—The oldest exposed rocks in the survey area were deposited as sandy, clayey, and limy sediment in an ancient sea. This sea covered most of Montana northwest of Missoula more than 600 million years ago. As these deposits built up, heat and pressure hardened them predominantly into quartzite and argillite. The middle of the Precambrian section (Piegan Group) is composed of dolomite and sideritic limestone, argillite, and quartzite. The Precambrian rocks are among the oldest exposed sedimentary rocks in the world. They are represented by the Ravalli, Piegan, and Missoula Groups, which are commonly referred to as the "Belt rocks."

Cambrian deposition.—After the retreat of the Precambrian sea, another shallow sea developed southeast of Missoula. Although limestone and dolomite are the major rock types, zones of argillite and quartzite also occur in this geologic section. The major geologic zones include the Maywood, Red Lion, Hasmark, Silverhill, and Flathead Formations.

Cretaceous intrusion and uplift.—Two dramatic events mark the Cretaceous period in Missoula County. About 75 million years ago, a large body of granite called the Idaho batholith was intruded beneath the southwestern part of the county. The heat of the intrusion metamorphosed local Belt rocks into gneiss and schist. Granite, gneiss, and schist are the most common rocks in the Lolo Creek area along the border with Idaho. Another area of granite (granodiorite) was intruded in the southeastern part of Missoula County, around Elk Creek and Ashby Creek.

Near the end of the Cretaceous period approximately 60 million years ago, the Rocky Mountains began their first period of active uplift. It was during this time that the survey area began to develop the landscape of high peaks and intermountain valleys that can be seen today.

Climate

The three tables at the end of this section give climate data as recorded at Missoula and Seeley Lake, Montana, for the period 1961-90.

The total annual precipitation is 13.49 inches at Missoula and 21.44 inches at Seeley Lake. Of this, 45 percent usually falls in April through September. The growing season for most crops falls within this period. Thunderstorms occur on about 25 days each year.

The average seasonal snowfall is 52.5 inches at Missoula and 122.6 inches at Seeley Lake. At least 1 inch of snow is on the ground an average of 72 days at Missoula and 123 days at Seeley Lake.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 70 percent. The sun shines 70 percent of the time possible in summer and 30 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 7 miles per hour, in spring.

Growing degree days, as shown in the table "Temperature and Precipitation," are equivalent to heat units. During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature of 40 degrees F.

TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at Missoula and Seeley Lake, Montana)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
MISSOULA:											
January----	29.6	14.8	22.2	50	-19	2	1.25	0.58	1.82	3	14.5
February---	36.8	20.3	28.5	56	-11	4	0.80	0.41	1.14	2	8.3
March------	46.3	25.7	36.0	68	1	37	0.98	0.62	1.30	3	6.9
April------	57.3	31.8	44.6	81	19	161	0.96	0.54	1.34	3	2.4
May--------	65.7	38.6	52.1	88	25	378	1.78	0.77	2.63	5	1.0
June-------	74.7	45.8	60.3	95	33	608	1.78	0.94	2.51	5	0.0
July-------	84.2	49.8	67.0	100	36	838	0.91	0.38	1.37	2	0.0
August-----	83.0	49.0	66.0	99	36	807	1.20	0.45	1.90	3	0.0
September--	70.6	40.2	55.4	92	24	464	1.12	0.37	1.74	3	0.0
October----	56.9	31.0	44.0	79	15	157	0.74	0.24	1.15	2	1.1
November---	40.4	24.0	32.2	62	0	18	0.81	0.47	1.11	2	6.0
December---	29.9	16.1	23.0	52	-17	2	1.17	0.64	1.63	3	12.3
Yearly:											
Average--	56.3	32.3	44.3	---	---	----	---	----	----	---	----
Extreme--	105	-30	---	101	-25	----	----	----	----	---	----
Total----	---	---	---	---	---	3,475	13.49	11.33	15.56	36	52.5

* See footnote at end of table.

TEMPERATURE AND PRECIPITATION--Continued

Month	Temperature: Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Precipitation: Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
SEELEY LAKE:											
January----	30.0	9.9	20.0	49	-32	0	2.99	1.49	4.29	9	36.7
February---	37.7	14.1	25.9	56	-30	1	1.75	0.95	2.46	5	17.0
March------	44.1	19.4	31.7	63	-15	10	1.56	0.86	2.18	5	15.0
April------	53.8	27.0	40.4	77	10	86	1.30	0.56	1.92	4	5.0
May--------	63.2	34.3	48.8	84	21	275	1.85	0.99	2.61	5	1.0
June-------	72.2	41.1	56.7	91	29	495	2.14	0.95	3.16	5	0.0
July-------	81.3	43.0	62.2	95	30	685	1.06	0.46	1.70	3	0.0
August-----	81.2	42.0	61.6	96	30	669	1.30	0.42	2.03	4	0.0
September--	69.8	35.4	52.6	89	21	381	1.43	0.41	2.26	4	0.0
October----	57.5	29.5	43.5	79	12	147	1.30	0.46	1.99	4	1.1
November---	39.7	22.3	31.0	61	-5	12	2.04	1.14	2.83	6	15.2
December---	30.0	12.8	21.4	49	-29	0	2.72	1.58	3.73	9	31.6
Yearly:											
Average--	55.0	27.6	41.3	---	---	----	---	----	----	---	---
Extreme--	101	-45	---	97	-40	----	---	----	----	---	---
Total----	---	---	---	---	---	2,765	21.44	17.50	24.54	63	122.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at Missoula and Seeley Lake, Montana)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
MISSOULA:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 8	May 22	June 15
2 years in 10 later than--	May 2	May 16	June 9
5 years in 10 later than--	Apr. 19	May 6	May 27
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 20	Sept. 11	Sept. 4
2 years in 10 earlier than--	Sept. 26	Sept. 16	Sept. 9
5 years in 10 earlier than--	Oct. 9	Sept. 27	Sept. 18
SEELEY LAKE:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 16	June 15	July 22
2 years in 10 later than--	May 11	June 7	July 14
5 years in 10 later than--	May 2	May 25	June 29
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 14	Aug. 30	Aug. 10
2 years in 10 earlier than--	Sept. 21	Sept. 5	Aug. 16
5 years in 10 earlier than--	Oct. 4	Sept. 17	Aug. 29

GROWING SEASON

(Recorded in the period 1961-90 at Missoula and Seeley Lake, Montana)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
MISSOULA:			
9 years in 10	143	118	89
8 years in 10	153	127	97
5 years in 10	172	143	113
2 years in 10	191	160	129
1 year in 10	202	169	137
SEELEY LAKE:			
9 years in 10	130	86	29
8 years in 10	138	95	40
5 years in 10	153	113	60
2 years in 10	168	132	80
1 year in 10	176	141	90

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

The State Soil Geographic Data Base (STATSGO) for Montana is the base for the general soil map of the Missoula County area. The map symbols are the same as those used for the STATSGO map units. In each major soil group, only two or three major soils or miscellaneous areas in the map unit are listed for the map symbol. The textures given for the soils in the groups are for the fraction less than 2 millimeters (fine earth) of the particle-size class in the control section. For more information about the general soil map units, refer to the STATSGO map for Montana.

Map Unit Descriptions

Dominantly Soils and Miscellaneous Areas on Flood Plains, Stream Terraces, and Alluvial Fans

232—Grantsdale-Moiese-Alberton

These soils are nearly level and very deep. They formed in alluvium. Grantsdale soils are well drained and are on stream terraces. They are loamy in the upper part and sandy in the lower part. Moiese soils are excessively drained and are sandy. They are on alluvial fans and stream terraces. Alberton soils are somewhat excessively drained and are loamy. They are on stream terraces.

233—Grassvalley-Desmet-Alberton

These soils are nearly level and very deep. Grassvalley soils are well drained and are clayey. They formed in glaciolacustrine deposits on lake plains. Desmet and Alberton soils are loamy. They formed in alluvium on stream terraces. Desmet soils are well drained, and Alberton soils are somewhat excessively drained.

288—Moiese-Bigarm-Xerofluvents

These soils are nearly level or gently sloping and are very deep. They formed in alluvium. Moiese soils are excessively drained and are sandy. They are on alluvial fans and stream terraces. Bigarm soils are somewhat excessively drained and are loamy. They are on stream terraces. Xerofluvents are somewhat poorly drained to well drained and are sandy or loamy. They are on flood plains and are frequently flooded.

592—Urban Land-Moiese-Alberton

This unit is mostly in nearly level areas. Urban land consists of areas in which most of the soil has been covered by asphalt, concrete, or buildings and the exposed soils have been highly disturbed. Moiese and Alberton soils are very deep. They formed in alluvium. Moiese soils are excessively drained and are sandy. They are on alluvial fans and stream terraces. Alberton soils are somewhat excessively drained and are loamy. They are on stream terraces.

667—Xerofluvents-Riverwash-Water

This unit is on flood plains and is frequently flooded. Xerofluvents are very deep. They are somewhat poorly drained to well drained and are loamy or sandy. They formed in alluvium. Riverwash consists of areas that are frequently reworked by water that has sandy, silty,

clayey, or gravelly sediments. These areas support little or no vegetation.

Dominantly Soils and Miscellaneous Areas on Mountains, Moraines, Hills, and Stream Terraces

39—Beeskove-Repp-Felan

These soils are strongly sloping to very steep and are very deep. They are well drained, are loamy, and have numerous rock fragments. The soils formed in colluvium derived from argillite and limestone. They are on mountains. Felan soils have a surface layer that was influenced by volcanic ash.

43—Bigarm-Haploxerolls-Bignell

These soils are steep or very steep, are very deep, and have numerous rock fragments. They are on hills and mountains. Bigarm soils are somewhat excessively drained and are loamy. They formed in alluvium or colluvium. Haploxerolls are well drained to excessively drained and are sandy or loamy. They formed in alluvium. Bignell soils are well drained and are clayey. They formed in alluvium.

45—Bignell-Yourame-Perma

These soils are steep or very steep, are very deep, and have numerous rock fragments. Bignell soils are well drained and are clayey. They formed in alluvium on hills and mountains. Yourame soils are well drained and are loamy. They formed in alpine till on moraines. Perma soils are somewhat excessively drained and are loamy. They formed in alluvium on hills.

46—Bignell-Crow-Greenough

These soils are moderately sloping to very steep, very deep, and well drained. They formed in alluvium on hills and mountains. Bignell soils are clayey and have numerous rock fragments. Crow soils are clayey. Greenough soils are loamy.

402—Mitten-Winkler-Tevis

These soils are steep or very steep and are very deep. They are somewhat excessively drained, are loamy, and have numerous rock fragments. They formed in colluvium derived from argillite and quartzite on mountains. Mitten soils have a surface layer that was influenced by volcanic ash.

435—Ovando-Elkner-Ambrant

These soils are moderately steep to very steep and are very deep. They are on mountains. Ovando soils are excessively drained, are sandy, and have numerous rock fragments. They formed in igneous colluvium. Elkner and Ambrant soils are somewhat excessively drained and are loamy. Elkner soils formed in igneous colluvium. Ambrant soils formed in colluvium derived from granite.

445—Perma-Wildgen-Yourame

These soils are moderately steep to very steep and are very deep. They are loamy and have numerous rock fragments. Perma soils are somewhat excessively drained. They formed in alluvium on hills. Wildgen and Yourame soils are well drained. They formed in alpine till on moraines.

446—Perma-Hanaker

These soils are nearly level to strongly sloping and are very deep. They are on stream terraces. Perma soils are somewhat excessively drained, are loamy, and have numerous rock fragments. They formed in alluvium. Hanaker soils are well drained and are loamy. They formed in glaciolacustrine deposits.

473—Repp-Whitore-Winkler

These soils are steep or very steep and are very deep. They are loamy and have numerous rock fragments. The soils formed in colluvium derived from argillite and limestone. They are on mountains. Repp and Whitore soils are well drained. Winkler soils are somewhat excessively drained.

510—Rumblecreek-Winfall-Hollandlake

These soils are moderately sloping to steep and are very deep. They are well drained. The soils are loamy and have numerous rock fragments. They formed in alpine till on moraines.

566—Tevis-Bignell-Yourame

These soils are strongly sloping to very steep and are very deep. They have numerous rock fragments. Tevis soils are somewhat excessively drained and are loamy. They formed in colluvium derived from argillite and quartzite. They are on mountains. Bignell soils are well drained and are clayey. They formed in alluvium on mountains. Yourame soils are well drained and are loamy. They formed in alpine till on moraines.

634—Wildgen-Winfall-Rumblecreek

These soils are strongly sloping to very steep and are very deep. They are well drained. The soils are loamy and have numerous rock fragments. They formed in alpine till on moraines.

646—Winkler-Evaro-Tevis

These soils are strongly sloping to very steep and are very deep. They are somewhat excessively drained, are loamy, and have numerous rocks. They are on mountains. Winkler soils formed in colluvium derived from argillite and limestone. Evaro and Tevis soils formed in colluvium derived from argillite and quartzite. Evaro soils have a surface layer that was influenced by volcanic ash.

647—Winkler-Evaro-Rock Outcrop

This unit is strongly sloping to very steep. It is on mountains. Winkler and Evaro soils are very deep and are somewhat excessively drained. They are loamy and have numerous rock fragments. Winkler soils formed in colluvium derived from argillite and limestone. Evaro soils formed in colluvium derived from argillite, limestone, and quartzite bedrock.

648—Winkler-Tevis-Mitten

These soils are moderately steep to very steep and are very deep. They are somewhat excessively drained, are loamy, and have numerous rock fragments. They are on mountains. Winkler soils formed in colluvium derived from argillite and limestone. Tevis and Mitten soils formed in colluvium derived from argillite and quartzite. Mitten soils have a surface layer that was influenced by volcanic ash.

662—Repp-Yourame-Trapps

These soils are moderately sloping to very steep and are very deep. They are well drained, are loamy, and have numerous rock fragments. Repp and Trapps soils formed in colluvium derived from argillite and limestone. They are on mountains. Yourame soils formed in alpine till. They are on moraines.

684—Yourame-Greenough-Winkler

These soils are moderately sloping to very steep and are very deep. Yourame soils are well drained, are loamy, and have numerous rock fragments. They formed in alpine till on moraines. Greenough soils are well drained and are loamy. They formed in alluvium on hills. Winkler soils are somewhat excessively drained, are loamy, and have numerous rock fragments. They formed in colluvium derived from argillite and limestone. They are on mountains.

Dominantly Soils and Rock Outcrop on Moraines, Mountains, Cirque Basins, and Lake Plains

198—Felan-Winfall

These soils are moderately sloping to very steep and are well drained. They are loamy and have numerous rock fragments. Felan soils formed in colluvium derived from argillite and limestone. They are on mountains. They have a surface layer that was influenced by volcanic ash. Winfall soils formed in alpine till on moraines.

280—Holloway-Mitten-Waldbillig

These soils are moderately sloping to very steep and are very deep. They are loamy and have numerous rock fragments. They have a surface layer that was influenced by volcanic ash. Holloway and Mitten soils are somewhat excessively drained. They formed in colluvium derived from argillite and quartzite. They are on mountains. Waldbillig soils are well drained. They formed in alpine till on moraines.

281—Holloway-Evaro-Mitten

These soils are moderately sloping to very steep, very deep, and somewhat excessively drained. They are loamy and have numerous rock fragments. The soils formed in colluvium derived from argillite and quartzite. They are on mountains. They have a surface layer that was influenced by volcanic ash.

283—Holloway-Rock Outcrop-Winkler

This unit is strongly sloping to very steep and is on mountains. Holloway and Winkler soils are very deep and are somewhat excessively drained. They are loamy and have numerous rock fragments. They formed in colluvium derived from argillite and quartzite. Holloway soils have surface layer that was influenced by volcanic ash. The Rock outcrop consists mainly of argillite and quartzite bedrock.

289—Jimlake-Bata-Auggie

These soils are gently sloping to steep and are very deep. They are well drained. Jimlake and Bata soils are loamy and have numerous rock fragments. They formed in alpine till on moraines. They have a surface layer that was influenced by volcanic ash. Auggie soils are loamy. They formed in glaciolacustrine deposits on lake plains and moraines.

322—Lantern-Chickaman-Lolopeak

These soils are strongly sloping to very steep and are very deep. They are on mountains. Lantern and Chickaman soils are somewhat excessively drained. They formed in micaceous schist. Lantern soils are loamy and have numerous rock fragments. Chickaman soils are loamy and have a surface layer that was influenced by volcanic ash. Lolopeak soils are excessively drained, are sandy, and have numerous

rock fragments. They formed in colluvium derived from granite and gneiss. They have a surface layer that was influenced by volcanic ash.

449—Petty-Lolopeak-Selway

These soils are steep or very steep, are very deep, and have numerous rock fragments. They are on mountains. Petty soils are somewhat excessively drained and are loamy. They formed in material weathered from igneous rocks. Lolopeak soils are excessively drained and are sandy. They formed in colluvium derived from granite and gneiss. Selway soils are somewhat excessively drained and are loamy. They formed in igneous colluvium. Petty and Lolopeak soils have a surface layer that was influenced by volcanic ash. Petty and Selway soils have boulders on the surface.

609—Waldbillig-Courville-Bata

These soils are moderately sloping to very steep, very deep, and well drained. They are loamy and have numerous rock fragments. The soils formed in alpine till on moraines. They have a surface layer that was influenced by volcanic ash.

610—Waldbillig-Holloway-Felan

These soils are moderately sloping to very steep and are very deep. They are loamy and have numerous rock fragments. They have a surface layer that was influenced by volcanic ash. Waldbillig soils are well drained. They formed in alpine till and are on moraines. Holloway soils are somewhat excessively drained. They formed in colluvium derived from argillite and quartzite and are on mountains. Felan soils are well drained. They formed in colluvium derived from argillite and limestone and are on mountains.

611—Waldbillig-Phillcher-Coerock

These soils are moderately sloping to very steep, are loamy, and have numerous rock fragments. They have a surface layer that was influenced by volcanic ash. Waldbillig soils are very deep and are well drained. They formed in alpine till on moraines. Phillcher soils are very deep and are somewhat excessively drained. They formed in colluvium and alpine till derived from argillite and quartzite. They are on moraines and mountains. Coerock soils are shallow and are well drained. They formed in volcanic ash over argillite or quartzite bedrock. They are in cirque basins and on mountains.

Dominantly Rock Outcrop, Rubble Land, and Soils on Mountains

282—Rock Outcrop-Holloway-Phillcher

This unit is very steep. Holloway and Phillcher soils are very deep and somewhat excessively drained. They are loamy and have numerous rock fragments. The soils formed in colluvium derived from argillite and quartzite and are on mountains. They have a surface layer that was influenced by volcanic ash. The Rock outcrop consists mainly of argillite and quartzite bedrock.

351—Lolopeak-Rubble Land-Rock Outcrop

This unit is very steep and is on mountains. Lolopeak soils are very deep and are excessively drained. They are sandy and have numerous rock fragments. They formed in colluvium derived from granite and gneiss. They have a surface layer that was influenced by volcanic ash. Areas of Rubble land consist mainly of granite and gneiss stones and boulders. The Rock outcrop consists mainly of granite and gneiss bedrock.

450—Petty-Rock Outcrop

This unit is very steep and is on mountains. Petty soils are very deep and are somewhat excessively drained. They are loamy and have numerous rock fragments. They formed in material weathered from igneous rocks and have a surface layer that was influenced by volcanic ash and is bouldery. The Rock outcrop consists mainly of granite and gneiss bedrock.

483—Rock Outcrop-Coerock-Phillcher

This unit is moderately sloping to very steep. The Rock outcrop consists mainly of argillite and quartzite bedrock. Coerock and Phillcher soils are loamy and have numerous rock fragments. They have a surface layer that was influenced by volcanic ash. Coerock soils are shallow and are well drained. They formed in volcanic ash over argillite and quartzite bedrock. They are in cirque basins and on mountains. Phillcher soils are very deep and are somewhat excessively drained. They formed in colluvium derived from argillite and quartzite. They are on mountains.

485—Rock Outcrop

This unit consists mainly of exposures of hard bedrock on mountain side slopes and ridges.

487—Rock Outcrop-Holloway-Coerock

This unit is moderately sloping to very steep. The Rock outcrop consists mainly of argillite and quartzite

bedrock. Holloway and Coerock soils are loamy and have numerous rock fragments. They have a surface layer that was influenced by volcanic ash. Holloway soils are very deep and are somewhat excessively drained. They formed in colluvium derived from argillite and quartzite. They are on mountains. Coerock soils are shallow and are well drained. They formed in volcanic ash over argillite and quartzite. They are in cirque basins and on mountains.

493—Rock Outcrop-Rubble Land-Lolopeak

This unit is very steep. It is on mountains. The Rock outcrop consists mainly of granite and gneiss bedrock. Areas of Rubble land consist mainly of granite and gneiss stones and boulders. Lolopeak soils are very deep and are excessively drained. They are sandy and have numerous rock fragments. The soils formed in colluvium derived from granite and gneiss. They have a surface layer that was influenced by volcanic ash.

496—Rock Outcrop-Evaro-Holloway

This unit is moderately sloping to very steep. It is on mountains. The Rock outcrop consists mainly of argillite and quartzite bedrock. Evaro and Holloway soils are very deep and are somewhat excessively drained. They are loamy and have numerous rock fragments. The soils formed in colluvium derived from argillite and quartzite. They have a surface layer that was influenced by volcanic ash.

Formation and Classification of the Soils

This section relates the major factors of soil formation to the soils in the survey area and describes the system of soil classification. The classification and extent of the soils in this survey area are shown in the tables "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," which are at the end of this section.

Formation of the Soils

Soil is formed by the action of soil-forming processes on material deposited or accumulated by geological forces. The characteristics of a soil at any given point depend on the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and has existed since accumulation; the plant and animal life on and in the soil; relief, or lay of the land, and the length of time the forces of soil development have acted on the soil material.

All five of these factors are important in the genesis of each soil; some have had more influence than others on a given soil.

Parent material is the unconsolidated mass from which a soil forms. It is one of the most important factors of soil formation. Many of the soils in different formations in the survey area are similar because the parent material in which the soils formed is similar. Many types of rock can make up a formational unit, and each type influences the type of soil that develops. For example, granite, limestone, schist, quartzite, or argillite can occur within a formation.

Uplifted rock units of Precambrian, Cambrian, and Cretaceous age are subject to physical and chemical weathering. The weathering creates a mantle of unconsolidated material, called residuum, over the bedrock. Soils that formed in residuum are commonly shallow. As residuum is transported downslope by gravity, the parent material becomes thicker. The depth to bedrock generally is greater in downslope areas. Parent material in downslope areas is called colluvium. Soils that formed in colluvium commonly have 50 to 80 percent rock fragments. They are commonly loam or sandy loam.

Winkler, Tevis, Mitten, Evaro, Phillcher, and Holloway soils are in areas dominated by deep quartzite and argillite colluvium. Bedrock outcrops occur randomly throughout areas of these soils. The soils, although they formed from the same type of parent material, have different morphological properties and climatic conditions. For example, Sharrott and Coerock soils are in areas where colluvium is less than 20 inches deep over bedrock.

Repp, Beeskove, Trapps, Whitore, and Felan soils are in areas of limestone or other calcareous rock. Trapps soils have a slight accumulation of clay in the subsoil. Ambrant, Ovando, Rochester, Elkner, Selway, Petty, and Lolopeak soils are in areas of very deep granite colluvium, mostly quartz monzonite and granodiorite. Chickaman and Lantern soils are in colluvial areas of schist.

Tertiary Uplift and Erosion.—Events during the Tertiary period left an extremely complex distribution of soils in many areas of the survey area. An arid climate dominated the area for most of the Tertiary period. Extensive erosion occurred as the mountains were uplifted. Intense rainstorms carried sediment into the valleys, but streams did not develop to transport the sediment to the ocean. The Missoula Valley contains material as much as several thousand feet thick that eroded from the local mountains.

Although an arid climate dominated the area, moist periods did occur. They enabled plant life to flourish and to stabilize the land surface. Many of the soils that formed during moist periods have a clayey subsoil. New material was deposited on some soils in subsequent drier periods. Because of the alternating climate, some areas have buried soils deposited one upon another.

During the Tertiary period, lakes occupied some valley areas and left fine-textured deposits. Tertiary volcanoes in southwestern Montana deposited ash in some areas. Slumps and mudflows also occurred. The diverse array of Tertiary materials was also subjected to faulting and deformation as the mountains continued to

uplift. The Clark Fork Valley, for example, has sediment that is tilted at many angles. Uplift that occurred later in the Tertiary period resulted in steeper slopes and the deposition of coarse, rocky material on the surface. Erosion during the late Pleistocene and Holocene epochs removed hundreds of feet of material from some of the Tertiary deposits and reshaped others.

Shooflin, Lubrecht, and Crow soils are in forested areas of clayey Tertiary deposits. Hagstadt and Greenough soils are in forested areas of silty deposits. Hagstadt and Lubrecht soils have consolidated siltstone at a depth of 20 to 40 inches. Bignell soils have a very gravelly and clayey subsoil.

Bigarm and Bigarm variant soils are loamy and gravelly and are in grassland areas. They do not have a clayey subsoil. Many types of soils, including those that are very gravelly and very clayey, are mainly in the Missoula Valley foothills. These soils are distributed so randomly and in such small units that they cannot be delineated separately. They are grouped in the Argixerolls-Haploxerolls complex.

Pleistocene glaciation.—About two to three million years ago, the climate became much more moist and slightly cooler. Large masses of ice collected as continental glaciers entered Montana from the north, and smaller glaciers formed on local mountain ranges. Although this period commonly is called the ice age, a number of different advances and retreats of glaciers have been identified in the Rocky Mountains. Glacial landscapes therefore have sequences of till and other sediments deposited one upon another, sometimes giving them a complexity similar to that of Tertiary landscapes. Continental glaciation possibly occurred in Missoula County when the Cordillerian ice sheet advanced through the Swan-Clearwater Valley from Bigfork to Clearwater Junction. Smaller mountain glaciers formed in the Rattlesnake Wilderness and along the Montana-Idaho border from Lolo Peak westward. Mountain glaciers also formed in the Mission and Swan Ranges and moved along the Swan and Clearwater Valleys.

Several distinctive types of deposits are associated with glaciation, including till, outwash, and lake deposits.

Glacial till generally is a heterogeneous, unsorted mixture of soil that contains many sizes and shapes of rocks. Pebbles, cobbles, stones, and boulders commonly are present. They have been subrounded by glacial transport. Very gravelly and extremely gravelly loam and silt loam commonly formed in glacial till. These materials generally have fewer rock fragments than colluvial soils, except in areas near bedrock outcrops and in alpine areas. Winfall, Courville, Bata, Rumblecreek, Hollandlake, Wildgen, and Waldbillig soils are in areas of loamy, noncalcareous till. Jimlake and Yourame soils are in areas of loamy, calcareous till.

Till landscapes commonly have a kettle-and-mound topography that is characterized by poorly drained, wet, and depressional areas. Organic soils formed in some wet, depressional areas. In areas that are large enough to delineate, these soils are called Borohemists.

Melting glacial ice caused local streams to swell to many times their current size. These streams carried sandy, gravelly, and cobbly material that was deposited as glacial outwash fans and terraces. Water in ice-dammed lakes to the west of the survey area periodically broke through the dams. It deposited more outwash material in the survey area. Soils that formed in outwash are extremely porous and have a very low water- and nutrient-holding capacity. Outwash terraces are common along most drainageways on glacial landscapes. Glaciercreek and Upsata soils are in areas of outwash deposits. They contain numerous rock fragments. Tally variant soils and Udorthents are in areas of soils with a deep, sandy surface layer that does not contain rocks.

Swollen glacial outwash streams also had a significant effect downstream from the glaciated areas. Hundreds of feet of Tertiary sediment was removed from the Missoula Valley area during the Pleistocene epoch. The moist climate and the local fault activity also stimulated slumps and earthflows in the clayey Tertiary material.

Glaciation blocked many streams with ice and created some very large, ice-dammed lakes. Near the end of the last ice age, a lobe of the Cordillerian ice sheet blocked the Clark Fork River in northern Idaho and created Glacial Lake Missoula. The lake was 1,000 feet deep at Missoula and extended up local drainageways to an elevation of about 4,200 feet. The lake filled with water and then the ice dam broke, causing catastrophic drainage events. The pattern of the lake filling and dam breaking was repeated numerous times. Deposits from Glacial Lake Missoula are present in only a few areas today, mainly in the wider valleys. They generally are silt, clay, and fine sand and do not have rocks. The clay fraction is dominated by illite-type clay. Within till areas, especially the Swan and Clearwater Valleys, small glacial lakes formed. Half Moon and Auggie soils are in forested glacial lake deposits in Missoula County. Grassvalley and Hanaker soils are on grassland lake deposits.

Recent events.—In the 10,000 years since the last glaciers retreated, several events have influenced the local soils. Volcanic activity on the West Coast probably has had the most dramatic influence. Several Cascade Range volcanoes, including Glacier Peak, Mount Mazama, and Mount St. Helens, have erupted, spewing

ash across the Northwest. The Mount Mazama eruption about 6,600 years ago probably was the most significant. Although many of the local soils have been influenced by volcanic ash to some degree, at least 14 of the soils in Missoula County have a surface layer that ranges from 7 to 10 inches thick and contains volcanic ash. These soils include Mitten, Phillcher, Holloway, Chickaman, Coerock, Felan, Lolopeak, and Petty soils, which formed on a bedrock substrate; Courville, Waldbillig, Jimlake, and Bata soils, which formed in alpine till; and Glaciercreek and Upsata soils, which formed in glacial outwash.

In some areas, erosion and mass-wasting processes continue to remove soil material. In other areas, deposition increases the amount of soil material. The streams in the survey area meander on recently developed flood plains. Areas that are subject to flooding are characterized by poorly developed soils. The soils on flood plains are Xerofluvents and Udifluvents.

In landscape positions above the flood plains, several terrace levels have developed. In the wider valleys, the terraces are as much as several miles wide and are similar to the downstream terraces. They probably formed in the late Pleistocene or Holocene epochs. The texture and the content of rock fragments are highly variable, but the depth to gravel generally increases and the texture becomes finer as distance from the streams increases. Most of the prime agricultural land in the survey area is on these terraces.

Moiese, Grantsdale, Desmet, and Alberton soils and Aquic Haploxerolls are on terraces. Moiese soils are sandy and extremely gravelly. Grantsdale soils have loam in the upper part and sand and gravel in the lower part. They do not have rocks in the surface layer. Desmet and Alberton soils are very deep. They are silty or loamy and do not have rocks. Aquic Haploxerolls are loamy. They have a seasonal high water table.

Most recently, humans have influenced soil formation in the survey area. Some areas have been filled or otherwise reworked with heavy machinery, mixing the natural soil. Other areas of urban land have houses, buildings, streets, driveways, and other cultural features.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept (*Ochr*, meaning pale, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ustochrepts (*Ust*, meaning burnt, plus *ochrept*, the suborder of the Inceptisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup. An example is Typic Ustochrepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-skeletal, mixed, frigid Typic Ustochrepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alberton	Coarse-loamy, mixed, frigid Aridic Haploxerolls
Ambrant	Coarse-loamy, mixed, frigid Udic Ustochrepts
Aquic Haploxerolls	Aquic Haploxerolls
Aquic Udorthents	Aquic Udorthents
Aquepts	Aquepts
Aquolls	Aquolls
Argixerolls	Argixerolls
Auggie	Fine-silty, mixed Typic Cryoboralfs
Bata	Loamy-skeletal, mixed Andeptic Cryoboralfs
Beeskove	Loamy-skeletal, mixed, frigid Typic Eutrochrepts
Bigarm	Loamy-skeletal, mixed, frigid Typic Haploxerolls
Biglake	Sandy-skeletal, mixed, frigid Typic Haploxerolls
Bignell	Clayey-skeletal, mixed Typic Eutroboralfs
Borohemists	Borohemists
Chickaman	Coarse-silty, micaceous Andic Cryochrepts
Coerock	Medial-skeletal Lithic Cryandepts
Courville	Loamy-skeletal, mixed, frigid Andic Dystric Eutrochrepts
Crow	Fine, mixed Typic Eutroboralfs
Desmet	Coarse-silty, mixed, frigid Calciorthidic Haploxerolls
Elkner	Coarse-loamy, mixed Typic Cryochrepts
Evaro	Loamy-skeletal, mixed Typic Cryochrepts
Felan	Loamy-skeletal, mixed Andic Cryochrepts
Glaciercreek	Sandy-skeletal, mixed, frigid Andic Dystric Eutrochrepts
Glaciercreek variant	Coarse-loamy, mixed, frigid Dystric Eutrochrepts
Grantsdale	Coarse-silty over sandy or sandy-skeletal, mixed, frigid Calciorthidic Haploxerolls
Grassvalley	Fine, illitic, frigid Typic Haploxeralfs
Greenough	Fine-silty, mixed Typic Eutroboralfs
Hagstadt	Fine-silty, mixed, frigid Udic Ustochrepts
Half Moon	Fine-silty, mixed Typic Eutroboralfs
Hanaker	Fine-silty, mixed Typic Argiborolls
Haploxerolls	Haploxerolls
Hollandlake	Loamy-skeletal, mixed Typic Cryoboralfs
Holloway	Loamy-skeletal, mixed Andic Cryochrepts
Jimlake	Loamy-skeletal, mixed Andeptic Cryoboralfs
Lantern	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts
Lolopeak	Sandy-skeletal, mixed Andic Cryumbrepts
Lubrecht	Fine, mixed Typic Eutroboralfs
Mitten	Loamy-skeletal, mixed, frigid Andic Dystric Eutrochrepts
Moiese	Sandy-skeletal, mixed, frigid Calciorthidic Haploxerolls
Orthents	Orthents
Ovando	Sandy-skeletal, mixed Typic Cryorthents
Perma	Loamy-skeletal, mixed Typic Haploborolls
Perma variant	Loamy-skeletal, mixed Typic Argiborolls
Petty	Loamy-skeletal, mixed Andic Cryochrepts
Phillcher	Loamy-skeletal, mixed Andic Cryochrepts
Repp	Loamy-skeletal, mixed, frigid Typic Ustochrepts
Rochester	Sandy-skeletal, mixed, frigid Typic Ustorthents
Rumblecreek	Loamy-skeletal, mixed Typic Eutroboralfs
Selway	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts
Sharrott	Loamy-skeletal, mixed, frigid Lithic Ustochrepts
Shooflin	Very fine, montmorillonitic Typic Eutroboralfs
Tally variant	Sandy, mixed Typic Haploborolls
Tevis	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts
Totelake	Sandy-skeletal, mixed, frigid Udic Ustochrepts
Trapps	Loamy-skeletal, mixed Typic Eutroboralfs
Turrah	Fine, mixed, frigid Cumulic Haplaquolls
Udifluvents	Udifluvents
Udorthents	Udorthents
Upsata	Sandy-skeletal, mixed Andic Cryochrepts
Waldbillig	Loamy-skeletal, mixed Andic Cryochrepts
Whitore	Loamy-skeletal, carbonatic Typic Cryochrepts
Wildgen	Loamy-skeletal, mixed, frigid Udic Ustochrepts
Winfall	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts

CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Winkler	Loamy-skeletal, mixed, frigid Udic Ustochrepts
Xerofluvents	Xerofluvents
Yourame	Loamy-skeletal, mixed Typic Eutroboralfs

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Alberton very fine sandy loam, 0 to 2 percent slopes	4,900	0.4
2	Ambrant gravelly sandy loam, 15 to 30 percent slopes	3,230	0.3
3	Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes	3,210	0.3
4	Aquic Haploxerolls, 0 to 2 percent slopes	1,670	0.1
5	Aquic Udorthents, 0 to 2 percent slopes	1,480	0.1
6	Aquolls and Aquepts, 0 to 2 percent slopes	11,020	0.9
7	Argixerolls-Haploxerolls complex, 0 to 4 percent slopes	4,280	0.3
8	Argixerolls-Haploxerolls complex, 4 to 15 percent slopes	13,070	1.0
9	Argixerolls-Haploxerolls complex, 15 to 30 percent slopes	8,290	0.7
10	Argixerolls-Haploxerolls complex, 30 to 60 percent slopes	1,750	0.1
11	Auggie silt loam, 4 to 15 percent slopes	3,960	0.3
12	Bata gravelly silt loam, cool, 2 to 8 percent slopes	980	*
13	Bata-Waldbillig gravelly silt loams, 4 to 30 percent slopes	13,980	1.1
14	Beeskove gravelly loam, 30 to 60 percent slopes	14,660	1.1
15	Beeskove-Rock outcrop complex, 50 to 80 percent slopes	1,870	0.1
16	Bigarm gravelly loam, 0 to 4 percent slopes	9,980	0.8
17	Bigarm gravelly loam, 4 to 15 percent slopes	2,760	0.2
18	Bigarm gravelly loam, 15 to 30 percent slopes	7,360	0.6
19	Bigarm gravelly loam, 30 to 60 percent slopes	18,760	1.5
20	Bigarm-Rock outcrop complex, 30 to 60 percent slopes	5,400	0.4
21	Biglake gravelly sandy loam, 8 to 15 percent slopes	330	*
22	Biglake gravelly sandy loam, 15 to 30 percent slopes	1,710	0.1
23	Bignell gravelly loam, 8 to 30 percent slopes	22,110	1.7
24	Bignell-Winkler, cool, complex, 30 to 60 percent slopes	2,760	0.2
25	Bignell, warm-Winkler complex, 30 to 60 percent slopes	3,120	0.2
26	Borohemists, 0 to 2 percent slopes	1,430	0.1
27	Chickaman silt loam, 8 to 30 percent slopes	180	*
28	Chickaman silt loam, 30 to 60 percent slopes	6,480	0.5
29	Coerock-Rock outcrop complex, 4 to 30 percent slopes	6,130	0.5
30	Coerock-Rock outcrop complex, 50 to 80 percent slopes	7,610	0.6
31	Courville gravelly silt loam, 8 to 30 percent slopes	2,610	0.2
32	Courville-Mitten gravelly silt loams, 30 to 60 percent slopes	1,950	0.2
33	Crow silt loam, 4 to 15 percent slopes	8,250	0.7
34	Desmet loam, 0 to 2 percent slopes	4,700	0.4
35	Elkner-Ovando complex, 8 to 30 percent slopes	1,640	0.1
36	Evaro gravelly loam, 8 to 30 percent slopes	7,110	0.6
37	Evaro gravelly loam, 30 to 60 percent slopes	12,600	1.0
38	Felan gravelly silt loam, 8 to 30 percent slopes	6,280	0.5
39	Felan gravelly silt loam, 30 to 60 percent slopes	24,960	2.0
40	Felan gravelly silt loam, cool, 8 to 30 percent slopes	2,550	0.2
41	Felan gravelly silt loam, cool, 30 to 60 percent slopes	6,450	0.5
42	Glaciercreek gravelly silt loam, 0 to 4 percent slopes	7,200	0.6
43	Glaciercreek variant-Glaciercreek complex, 4 to 20 percent slopes	3,110	0.2
44	Grantsdale loam, 0 to 2 percent slopes	7,260	0.6
45	Grassvalley silty clay loam, 0 to 4 percent slopes	5,190	0.4
46	Grassvalley silty clay loam, 4 to 8 percent slopes	2,460	0.2
47	Grassvalley silty clay loam, 8 to 15 percent slopes	2,550	0.2
48	Grassvalley silty clay loam, 15 to 30 percent slopes	1,760	0.1
49	Greenough silt loam, 4 to 15 percent slopes	3,550	0.3
50	Hagstadt silt loam, 4 to 25 percent slopes	1,820	0.1
51	Half Moon silt loam, 4 to 8 percent slopes	3,490	0.3
52	Hanaker silt loam, 0 to 6 percent slopes	3,700	0.3
53	Hollandlake gravelly loam, 4 to 30 percent slopes	6,250	0.5
54	Hollandlake-Bata complex, 4 to 30 percent slopes	19,410	1.5
55	Hollandlake-Bata complex, 30 to 60 percent slopes	5,070	0.4
56	Holloway gravelly silt loam, 8 to 30 percent slopes	11,560	0.9
57	Holloway gravelly silt loam, 30 to 60 percent slopes	62,540	4.9
58	Holloway gravelly silt loam, cool, 8 to 30 percent slopes	5,350	0.4
59	Holloway gravelly silt loam, cool, 30 to 60 percent slopes	3,260	0.3
60	Holloway-Rock outcrop complex, 50 to 80 percent slopes	20,380	1.6
61	Jimlake gravelly silt loam, 4 to 30 percent slopes	22,790	1.8

* See footnote at end of table.

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
62	Jimlake gravelly silt loam, 30 to 60 percent slopes	3,810	0.3
63	Lantern gravelly sandy loam, 8 to 30 percent slopes	470	*
64	Lantern gravelly sandy loam, 30 to 60 percent slopes	4,230	0.3
65	Lantern-Rock outcrop complex, 50 to 80 percent slopes	1,300	0.1
66	Lolopeak bouldery loam, 50 to 80 percent slopes	3,580	0.3
67	Lolopeak-Rock outcrop complex, 50 to 80 percent slopes	3,900	0.3
68	Lubrecht silt loam, 4 to 15 percent slopes	3,300	0.3
69	Mitten gravelly silt loam, 30 to 60 percent slopes	2,960	0.2
70	Mitten-Sharrott, cool, complex, 15 to 40 percent slopes	2,580	0.2
71	Mitten-Tevis complex, 30 to 60 percent slopes	35,060	2.7
72	Moiese gravelly loam, 0 to 2 percent slopes	8,170	0.6
73	Orthents, 0 to 4 percent slopes	3,170	0.2
74	Ovando-Elkner-Rock outcrop complex, 30 to 60 percent slopes	5,440	0.4
75	Perma gravelly loam, 0 to 4 percent slopes	8,550	0.7
76	Perma gravelly loam, 20 to 45 percent slopes	1,980	0.2
77	Perma stony loam, 2 to 12 percent slopes	1,430	0.1
78	Perma variant stony silt loam, 2 to 8 percent slopes	840	*
79	Perma variant-Perma complex, 4 to 30 percent slopes	2,060	0.2
80	Petty gravelly loam, 8 to 30 percent slopes	4,960	0.4
81	Petty gravelly loam, 30 to 60 percent slopes	17,210	1.3
82	Petty bouldery loam, 30 to 60 percent slopes	6,650	0.5
83	Petty gravelly loam, cool, 8 to 30 percent slopes	7,960	0.6
84	Petty bouldery loam, cool, 50 to 80 percent slopes	2,610	0.2
85	Petty, cool-Rock outcrop complex, 50 to 80 percent slopes	2,340	0.2
86	Phillcher silt loam, 4 to 30 percent slopes	3,040	0.2
87	Phillcher-Rock outcrop complex, 50 to 80 percent slopes	6,270	0.5
88	Pits, gravel	780	*
89	Repp very gravelly loam, 30 to 60 percent slopes	19,330	1.5
90	Repp very gravelly loam, cool, 8 to 30 percent slopes	4,060	0.3
91	Repp very gravelly loam, cool, 30 to 60 percent slopes	22,080	1.7
92	Repp-Rock outcrop complex, 50 to 80 percent slopes	1,760	0.1
93	Riverwash	1,600	0.1
94	Rock outcrop-Rubble land complex	24,300	1.9
95	Rumblecreek gravelly loam, 4 to 30 percent slopes	13,310	1.0
96	Selway gravelly sandy loam, 8 to 30 percent slopes	1,380	0.1
97	Selway gravelly sandy loam, 30 to 60 percent slopes	3,440	0.3
98	Selway bouldery sandy loam, 30 to 60 percent slopes	2,810	0.2
99	Sharrott-Rock outcrop complex, 4 to 30 percent slopes	2,270	0.2
100	Shooflin silt loam, 4 to 15 percent slopes	6,640	0.5
101	Tally variant sandy loam, 0 to 4 percent slopes	1,100	*
102	Tevis gravelly loam, 30 to 60 percent slopes	28,200	2.2
103	Tevis-Mitten complex, 8 to 30 percent slopes	5,500	0.4
104	Tevis-Mitten-Rock outcrop complex, 45 to 70 percent slopes	3,590	0.3
105	Totelake gravelly loam, 2 to 8 percent slopes	10,210	0.8
106	Totelake gravelly loam, 8 to 30 percent slopes	2,620	0.2
107	Totelake extremely stony loam, 2 to 8 percent slopes	2,130	0.2
108	Trapps gravelly loam, 8 to 30 percent slopes	1,360	0.1
109	Trapps gravelly loam, 30 to 60 percent slopes	10,880	0.8
110	Turrah silty clay loam, 0 to 2 percent slopes	3,480	0.3
111	Udifluvents, 0 to 2 percent slopes	5,160	0.4
112	Udorthents-Glaciercreek complex, 0 to 8 percent slopes	2,110	0.2
113	Upsata gravelly fine sandy loam, 2 to 8 percent slopes	6,810	0.5
114	Urban land	6,230	0.5
115	Waldbillig gravelly silt loam, 4 to 30 percent slopes	42,690	3.3
116	Waldbillig gravelly silt loam, 30 to 60 percent slopes	1,370	0.1
117	Waldbillig-Auggie complex, 4 to 15 percent slopes	5,580	0.4
118	Waldbillig-Holloway gravelly silt loams, 8 to 30 percent slopes	29,050	2.3
119	Waldbillig-Holloway gravelly silt loams, 30 to 60 percent slopes	49,430	3.9
120	Waldbillig-Holloway gravelly silt loams, cool, 8 to 30 percent slopes	15,730	1.2
121	Waldbillig-Holloway gravelly silt loams, cool, 30 to 60 percent slopes	3,710	0.3
122	Whitore gravelly clay loam, 8 to 30 percent slopes	2,300	0.2

* See footnote at end of table.

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
123	Whitore gravelly clay loam, 30 to 60 percent slopes	2,220	0.2
124	Wildgen gravelly loam, 4 to 30 percent slopes	12,240	1.0
125	Wildgen-Winkler, cool, gravelly loams, 15 to 30 percent slopes	8,150	0.6
126	Wildgen-Winkler, cool, gravelly loams, 30 to 60 percent slopes	4,580	0.4
127	Wildgen, dry-Winkler complex, 15 to 30 percent slopes	2,440	0.2
128	Wildgen, dry-Winkler complex, 30 to 60 percent slopes	3,670	0.3
129	Winfall gravelly loam, 4 to 30 percent slopes	12,800	1.0
130	Winkler very gravelly sandy loam, 8 to 30 percent slopes	15,080	1.2
131	Winkler very gravelly sandy loam, 30 to 60 percent slopes	88,090	6.9
132	Winkler gravelly loam, cool, 8 to 30 percent slopes	21,120	1.6
133	Winkler gravelly loam, cool, 30 to 60 percent slopes	99,070	7.7
134	Winkler-Rubble land complex, 50 to 80 percent slopes	8,230	0.6
135	Winkler, cool-Rock outcrop complex, 50 to 80 percent slopes	12,150	0.9
136	Xerofluvents, 0 to 2 percent slopes	15,250	1.2
137	Yourame gravelly loam, 4 to 30 percent slopes	4,270	0.3
W	Water	23,000	1.8
	Total	1,281,500	100.0

* Less than 0.1 percent. The combined extent of the soils assigned an asterisk in the percent column is about 0.4 percent of the survey area.

Soil Series and Detailed Soil Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(15)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(14)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units on the detailed soil maps in Part III of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given in Part II of this survey.

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the

basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Holloway gravelly silt loam, 30 to 60 percent slopes, is a phase of the Holloway series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Mitten-Tevis complex, 30 to 60 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Aquolls and Aquepts, 0 to 2 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Riverwash is an example.

The table "Acreage and Proportionate Extent of the Soils" in Parts I and II of the manuscript gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils or miscellaneous areas.

Alberton Series

The Alberton series consists of very deep, somewhat excessively drained soils that formed in alluvium. These soils are on stream terraces. Slope is 0 to 2 percent. Elevation is 2,800 to 3,500 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 43 to 45 degrees F, and the frost-free season is 105 to 120 days.

Taxonomic Class: Coarse-loamy, mixed, frigid Aridic Haploxerolls

Typical Pedon

Alberton very fine sandy loam, 0 to 2 percent slopes, in an area of cropland, 500 feet west and 200 feet south of the north quarter corner of sec. 34, T. 15 N., R. 21 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; many very fine pores; neutral; abrupt smooth boundary.

A—9 to 16 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many fine roots and pores; neutral; clear wavy boundary.

Bw—16 to 30 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots and pores; neutral; clear wavy boundary.

BC—30 to 60 inches; light brownish gray (10YR 6/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; 10 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between depths of 8 and 24 inches

Mollic epipedon thickness: 10 to 18 inches

Depth to loamy fine sand and coarser material: More than 25 inches

Control section: 5 to 18 percent clay and more than 35 percent sand coarser than very fine sand

Mottles, relict: Few brown and yellow mottles below a depth of 25 inches in some pedons

Ap horizon

Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 5 to 18 percent
Reaction: pH 6.6 to 7.3

A horizon

Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Fine sandy loam or sandy loam
Clay content: 5 to 18 percent
Reaction: pH 6.6 to 7.3

Bw horizon

Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Fine sandy loam or sandy loam
Clay content: 5 to 18 percent
Reaction: pH 6.6 to 7.3

BC horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy sand or loamy fine sand
Clay content: 5 to 10 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.6 to 7.3

1—Alberton very fine sandy loam, 0 to 2 percent slopes

Composition

Alberton and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 2,800 to 3,500 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days

Component Description

Surface layer texture: Very fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 7.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Desmet and similar soils
- Grantsdale and similar soils
- Moiese and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Ambrant Series

The Ambrant series consists of very deep, somewhat excessively drained soils that formed in colluvium derived from granite. These soils are on mountain slopes. Slope is 15 to 60 percent. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 17 to 25 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Coarse-loamy, mixed, frigid Udic Ustochrepts

Typical Pedon

Ambrant gravelly sandy loam, in an area of Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes; in a forested area, 1,015 feet east and 300 feet south of the northwest corner of sec. 9, T. 12 N., R. 16 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 4 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and pores; 25 percent pebbles; neutral; clear wavy boundary.

E2—4 to 20 inches; light brownish gray (2.5Y 6/2) gravelly coarse sandy loam, grayish brown (2.5Y 5/2) moist; strong fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine pores; 25 percent pebbles; neutral; gradual wavy boundary.

E and Bt—20 to 39 inches; 75 percent light brownish gray (2.5Y 6/2) gravelly coarse sandy loam, dark grayish brown (2.5Y 4/2) moist (E part); 25 percent dark grayish brown (2.5Y 4/2) gravelly sandy loam lamellae, very dark grayish brown (2.5Y 3/2) moist (Bt part); when mixed, texture is gravelly coarse sandy loam; weak fine and medium blocky structure parting to moderate fine and medium granular; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine pores; 35 percent pebbles; neutral; gradual wavy boundary.

2C—39 to 60 inches; light brownish gray (2.5Y 6/2) very gravelly coarse sand, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; 55 percent pebbles; neutral.

Range in Characteristics

E1 horizon
Value: 5 to 7 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 0 to 35 percent—0 to 25 percent cobbles, stones, or boulders, 5 to 35 percent angular pebbles
Reaction: pH 5.6 to 7.3

E2 horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Coarse sandy loam or loamy coarse sand
Clay content: 5 to 15 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles, stones, or boulders, 5 to 35 percent angular pebbles
Reaction: pH 5.6 to 7.3

E and Bt horizon
Hue: E part—10YR or 2.5Y; Bt part—10YR or 2.5Y
Value: E part—6 or 7 dry and 4 to 6 moist; B part—4 or 5 dry and 3 or 4 moist
Chroma: E part—2 or 3; B part—2 or 3
Clay content, mixed: 5 to 18 percent; less than 3 percent clay increase in lamellae
Texture: Sandy loam or coarse sandy loam
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles, 10 to 35 percent angular pebbles
Reaction: pH 5.6 to 7.3

2C horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Coarse sandy loam, coarse sand, loamy coarse sand, sand, or loamy sand
Clay content: 0 to 5 percent
Content of rock fragments: 15 to 60 percent—10 to 25 percent cobbles and stones, 10 to 45 percent angular pebbles
Reaction: pH 5.6 to 7.3

2—Ambrant gravelly sandy loam, 15 to 30 percent slopes

Composition

Ambrant and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 15 to 30 percent
Elevation: 4,500 to 5,500 feet
Mean annual precipitation: 17 to 25 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Rochester, warm, soils
- Areas of rock outcrop
- Sandy soils that are shallow over bedrock
- Soils that have a subsoil of sandy clay loam

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

3—Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes

Composition

Ambrant and similar soils: 40 percent
Rochester and similar soils: 30 percent
Rock outcrop: 15 percent
Inclusions: 15 percent

Setting

Landform:
- Ambrant—Mountains
- Rochester—Mountains
- Rock outcrop—Mountains

Slope:
- Ambrant—30 to 60 percent
- Rochester—30 to 60 percent
- Rock outcrop—30 to 60 percent

Elevation: 4,500 to 5,500 feet
Mean annual precipitation: 17 to 25 inches
Frost-free period: 60 to 90 days

Component Description

Ambrant
Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained

Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.8 inches

Rochester
Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.6 inches

Rock outcrop
Definition: Exposures of granite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Soils that are shallow over bedrock

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

Aquepts

Aquepts consist of very deep, poorly drained and very poorly drained soils that formed in alluvium. These soils are on flood plains. Slope is 0 to 2 percent. Elevation is 2,800 to 4,000 feet. The average annual precipitation is 11 to 30 inches, the average annual air temperature is 37 to 45 degrees F, and the frost-free season is 45 to 120 days.

Typical Pedon

Aquepts in a pastured area, 1,500 feet north of the southwest corner of sec. 33, T. 14 N., R. 20 W.

0 to 3 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; neutral; abrupt wavy boundary.

3 to 13 inches; light gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; common medium distinct brown and strong brown (7.5YR 4/4 and 5/8) mottles; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; neutral; clear wavy boundary.

13 to 29 inches; gray (N 6/0) sandy loam, very dark gray (N 3/0) moist; common medium distinct light brown and strong brown (7.5YR 6/4 and 5/8) mottles; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; neutral; clear smooth boundary.

29 to 60 inches; gray (N 6/0) very gravelly loamy sand, very dark gray (N 3/0) moist; common medium distinct yellowish red (5YR 5/8) mottles; massive; loose, nonsticky and nonplastic; neutral.

Range in Characteristics

Texture: Sand to clay
Depth to a seasonal high water table: 0 to 36 inches

Aquic Haploxerolls

Aquic Haploxerolls consist of very deep, somewhat poorly drained soils that formed in alluvium. These soils are on low stream terraces adjacent to streams and rivers in valley bottoms. Slope is 0 to 2 percent. Elevation is 3,000 to 3,200 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 43 to 45 degrees F, and the frost-free season is 105 to 120 days.

Typical Pedon

Aquic Haploxerolls in an area of hayland, 2,000 feet north and 2,700 feet east of the southwest corner of sec. 4, T. 13 N., R. 20 W.

0 to 11 inches; dark gray (10YR 4/1) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

11 to 17 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak thin and medium platy structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

17 to 30 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; weak medium and thick platy structure; soft, very friable, nonsticky and nonplastic; few very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

30 to 37 inches; light brownish gray (10YR 6/2) silt loam, brown (10YR 5/3) moist; few medium distinct dark yellowish brown and yellowish brown (10YR 4/4 and 5/6) mottles; weak medium and thick platy structure; soft, very friable, slightly sticky and slightly plastic; slightly effervescent; moderately alkaline; clear smooth boundary.

37 to 53 inches; light gray (10YR 7/2) silty clay loam, brown (10YR 5/3) moist; many medium distinct yellow and brownish yellow (10YR 7/8 and 6/8) mottles; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; mildly alkaline; clear smooth boundary.

53 to 60 inches; light gray (10YR 7/1) clay, brown (10YR 5/3) moist; few fine faint yellow and brownish yellow (10YR 7/8 and 6/8) mottles; massive; very hard, very firm, very sticky and very plastic; mildly alkaline.

Range in Characteristics

Texture: Sand to clay
Depth to a seasonal high water table: 20 to 40 inches

4—Aquic Haploxerolls, 0 to 2 percent slopes

Composition

Aquic Haploxerolls and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 3,000 to 3,200 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days

Component Description

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Flooding: None
Kind of water table: Apparent
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Well drained soils
- Poorly drained soils
- Areas of soils that are occasionally flooded

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Aquic Udorthents

Aquic Udorthents consist of very deep, somewhat poorly drained soils that formed in glacial outwash. These soils are on outwash plains. Slope is 0 to 2 percent. Elevation is 3,900 to 4,200 feet. The average annual precipitation is 21 to 23 inches, the average annual air temperature is 41 to 43 degrees F, and the frost-free season is 70 to 80 days.

Typical Pedon

Aquic Udorthents in an area of woodland, 1,800 feet north and 600 feet east of the southwest corner of sec. 28, T. 16 N., R. 15 W.

2 inches to 0; highly decomposed forest litter.

0 to 17 inches; pinkish gray (10YR 7/2) sandy loam, brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; medium acid; clear wavy boundary.

17 to 25 inches; pinkish gray (10YR 7/2) loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; medium acid; gradual smooth boundary.

25 to 60 inches; very pale brown (10YR 7/4) loamy sand, yellowish brown (10YR 5/4) moist; common medium faint grayish brown (10YR 5/2) mottles; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; neutral.

Range in Characteristics

Texture: Sandy loam to sand
Depth to a seasonal high water table: 20 to 40 inches

5—Aquic Udorthents, 0 to 2 percent slopes

Composition

Aquic Udorthents and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Outwash plains
Slope: 0 to 2 percent
Elevation: 3,900 to 4,200 feet

Mean annual precipitation: 21 to 23 inches
Frost-free period: 70 to 80 days

Component Description

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Glacial outwash
Flooding: None
Kind of water table: Apparent
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glaciercreek and similar soils
- Poorly drained soils
- Areas of soils that are occasionally flooded

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Aquolls

Aquolls consist of very deep, poorly drained and very poorly drained soils that formed in alluvium. These soils are on flood plains. Slope is 0 to 2 percent. Elevation is 2,800 to 4,000 feet. The average annual precipitation is 11 to 30 inches, the average annual air temperature is 37 to 45 degrees F, and the frost-free season is 45 to 120 days.

Typical Pedon

Aquolls in a pastured area, 1,000 feet north of the southeast corner of sec. 19, T. 20 N., R. 16 W.

0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; neutral; clear smooth boundary.

7 to 15 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; common medium distinct brown and strong brown (7.5YR 4/4 and 5/8) mottles; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; neutral; clear smooth boundary.

15 to 25 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; common medium distinct light brown and strong brown (7.5YR 6/4 and 5/8) mottles; massive; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots; neutral; clear wavy boundary.

25 to 29 inches; light gray (5Y 7/1) silt loam, gray (5Y 5/1) moist; common medium distinct yellowish red (5YR 5/8) mottles; massive; soft, friable, nonsticky and nonplastic; neutral; clear wavy boundary.

29 to 60 inches; light gray (5Y 7/1) gravelly silt loam, gray (5Y 5/1) moist; common medium distinct light greenish gray (5GY 7/1) and reddish yellow (7.5YR 6/6) mottles; massive; soft, friable, nonsticky and nonplastic; neutral.

Range in Characteristics

Texture: Sand to clay
Depth to a seasonal high water table: 0 to 36 inches

6—Aquolls and Aquepts, 0 to 2 percent slopes

Composition

Aquolls and similar soils: 45 percent
Aquepts and similar soils: 40 percent
Inclusions: 15 percent

Setting

Landform:
- Aquolls—Flood plains
- Aquepts—Flood plains

Slope:
- Aquolls—0 to 2 percent
- Aquepts—0 to 2 percent

Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 11 to 30 inches
Frost-free period: 45 to 120 days

Component Description

Aquolls
Dominant parent material: Alluvium
Flooding: Occasional
Kind of water table: Apparent
Note: The properties of these soils are highly variable.

Aquepts
Depth class: Very deep (more than 60 inches)
Dominant parent material: Alluvium
Flooding: Occasional
Kind of water table: Apparent
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have an organic surface layer
- Areas of soils that are not subject to flooding
- Well drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Argixerolls

Argixerolls consist of very deep, well drained soils that formed in Tertiary sediment. These soils are on alluvial fans, stream terraces, and hills. Slope is 0 to 60 percent. Elevation is 3,300 to 4,500 feet. The average annual precipitation is 13 to 16 inches, the average annual air temperature is 42 to 44 degrees F, and the frost-free season is 90 to 110 days.

Typical Pedon

Argixerolls in an area of rangeland, 1,150 feet north of the southeast corner of sec. 7, T. 12 N., R. 19 W.

0 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many very fine and few fine roots; common very fine pores; 10 percent pebbles; neutral; abrupt smooth boundary.

13 to 23 inches; pale brown (10YR 6/3) clay, yellowish brown (10YR 5/6) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky and very plastic; few very fine roots and pores; moderately alkaline; gradual smooth boundary.

23 to 36 inches; very pale brown (10YR 7/3) silty clay loam, yellowish brown (10YR 5/4) moist; moderate fine angular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; few fine pores; slightly effervescent; moderately alkaline; gradual smooth boundary.

36 to 60 inches; light brownish gray (10YR 6/2) gravelly silty clay loam, brown (10YR 5/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots and pores; 30 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Surface layer texture: Loam, gravelly loam, very gravelly loam, gravelly silt loam, or very gravelly silt loam

Subsurface layer texture: Extremely gravelly clay loam to clay

7—Argixerolls-Haploxerolls complex, 0 to 4 percent slopes

Composition

Argixerolls and similar soils: 50 percent
Haploxerolls and similar soils: 40 percent
Inclusions: 10 percent

Setting

Landform:
- Argixerolls—Alluvial fans and stream terraces
- Haploxerolls—Alluvial fans and stream terraces

Slope:
- Argixerolls—0 to 4 percent
- Haploxerolls—0 to 4 percent

Elevation: 3,300 to 4,500 feet
Mean annual precipitation: 13 to 16 inches
Frost-free period: 90 to 110 days

Component Description

Argixerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

Haploxerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a cobbly surface layer
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

8—Argixerolls-Haploxerolls complex, 4 to 15 percent slopes

Composition

Argixerolls and similar soils: 50 percent
Haploxerolls and similar soils: 40 percent
Inclusions: 10 percent

Setting

Landform:
- Argixerolls—Hills
- Haploxerolls—Hills

Slope:
- Argixerolls—4 to 15 percent
- Haploxerolls—4 to 15 percent

Elevation: 3,300 to 4,500 feet
Mean annual precipitation: 13 to 16 inches
Frost-free period: 90 to 110 days

Component Description

Argixerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

Haploxerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a cobbly surface layer
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

9—Argixerolls-Haploxerolls complex, 15 to 30 percent slopes

Composition

Argixerolls and similar soils: 50 percent
Haploxerolls and similar soils: 40 percent
Inclusions: 10 percent

Setting

Landform:
- Argixerolls—Hills
- Haploxerolls—Hills

Slope:
- Argixerolls—15 to 30 percent
- Haploxerolls—15 to 30 percent

Elevation: 3,300 to 4,500 feet
Mean annual precipitation: 13 to 16 inches
Frost-free period: 90 to 110 days

Component Description

Argixerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

Haploxerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a cobbly surface layer
- Soils that have a stony surface layer
- Grassvalley and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

10—Argixerolls-Haploxerolls complex, 30 to 60 percent slopes

Composition

Argixerolls and similar soils: 50 percent
Haploxerolls and similar soils: 40 percent
Inclusions: 10 percent

Setting

Landform:
- Argixerolls—Hills
- Haploxerolls—Hills

Slope:
- Argixerolls—30 to 60 percent
- Haploxerolls—30 to 60 percent

Elevation: 3,300 to 4,500 feet
Mean annual precipitation: 13 to 16 inches
Frost-free period: 90 to 110 days

Component Description

Argixerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

Haploxerolls
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a cobbly surface layer
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Auggie Series

The Auggie series consists of very deep, well drained soils that formed in glaciolacustrine deposits. These soils are on lake plains and moraines. Slope is 4 to 15 percent. Elevation is 3,800 to 4,400 feet. The average annual precipitation is 25 to 32 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Fine-silty, mixed Typic Cryoboralfs

Typical Pedon

Auggie silt loam, 4 to 15 percent slopes, in a forested area, 2,500 feet south and 1,300 feet west of the northeast corner of sec. 1, T. 20 N., R. 17 W.

O—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 6 inches; pinkish gray (7.5YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly acid; clear smooth boundary.

Bt/E—6 to 20 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist (Bt part); pinkish gray (7.5YR 7/2) silty clay loam, pinkish gray (7.5YR 6/2) moist (E part); moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots; common moderately thick clay films on faces of peds; slightly acid; clear smooth boundary.

Bt—20 to 45 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, very sticky and very plastic; few fine and medium roots; many moderately thick clay films on faces of peds and along root channels; mildly alkaline; gradual smooth boundary.

C—45 to 60 inches; pink (7.5YR 7/4) silt loam, brown (7.5YR 5/4) moist; weak medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; mildly alkaline.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between depths of 4 and 12 inches
Content of clay in the control section: 27 to 35 percent

E horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 5.6 to 7.3

Bt/E horizon
Hue: B part—10YR or 7.5YR; E part—10YR or 7.5YR

Value: B part—6 or 7 dry and 5 or 6 moist; E part—6 to 8 dry and 5 to 7 moist
Chroma: B part—2 to 4; E part—2 or 3
Clay content, mixed: 27 to 35 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.3

Bt horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.8

C horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.8

11—Auggie silt loam, 4 to 15 percent slopes

Composition

Auggie and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Lake plains
Slope: 4 to 15 percent
Elevation: 3,800 to 4,400 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Upsata and similar soils
- Poorly drained soils
- Waldbillig and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Bata Series

The Bata series consists of very deep, well drained soils that formed in alpine till. The surface layer of these soils has a high content of volcanic ash. The soils are on moraines. Slope is 2 to 60 percent. Elevation is 3,800 to 6,200 feet. The average annual precipitation is 30 to 45 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Andeptic Cryoboralfs

Typical Pedon

Bata gravelly silt loam, in an area of Bata-Waldbillig gravelly silt loams, 4 to 30 percent slopes; in a forested area, 1,450 feet east and 1,050 feet north of the southwest corner of sec. 25, T. 18 N., R. 16 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

Bs—0 to 9 inches; brown (7.5YR 5/4) gravelly silt loam, dark brown (7.5YR 4/4) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many fine pores; 15 percent pebbles; medium acid; clear wavy boundary.

2E/Bt—9 to 20 inches; about 70 percent pinkish gray (7.5YR 7/2) gravelly loam, pinkish gray (7.5YR 6/2) moist (E part); about 30 percent pink (7.5YR 7/4) gravelly loam, brown (7.5YR 5/4) moist (Bt part); weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; many fine pores; 30 percent pebbles; medium acid; clear wavy boundary.

2Bt1—20 to 36 inches; pink (7.5YR 7/4) very gravelly clay loam, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; very hard, firm, slightly sticky and plastic; few fine roots; common fine pores; few moderately thick clay films on faces of peds and lining pores; 40 percent pebbles; medium acid; gradual wavy boundary.

2Bt2—36 to 60 inches; light brown (7.5YR 6/4) very gravelly clay loam, brown (7.5YR 4/4) moist;

moderate medium subangular blocky structure; very hard, firm, slightly sticky and plastic; few fine roots; common fine pores; continuous moderately thick clay films on faces of peds and lining pores; 35 percent pebbles and 10 percent cobbles; slightly acid.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between depths of 4 and 12 inches
Content of clay in the control section: 20 to 35 percent
Other features: A thin discontinuous E horizon above the Bs horizon in some pedons; 2E and 2Bt/E horizons in some pedons

Bs horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 to 6
Clay content: 10 to 20 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles and stones, 15 to 30 percent pebbles
Reaction: pH 5.1 to 6.5
Moist bulk density: 1.0 g/cc or less

2E/Bt horizon
Hue: E part—10YR, 7.5YR, or 5YR; B part—10YR, 7.5YR, or 5YR
Value: E part—6 to 8 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—3 or 4
Clay content, mixed: 12 to 25 percent
Content of rock fragments: 25 to 60 percent—0 to 10 percent cobbles and stones, 25 to 50 percent pebbles
Reaction: pH 5.6 to 6.5

2Bt horizon
Hue: 10YR, 7.5YR, or 5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles and stones, 35 to 50 percent pebbles
Reaction: pH 5.6 to 6.5

12—Bata gravelly silt loam, cool, 2 to 8 percent slopes

Composition

Bata and similar soils: 90 percent
Inclusions: 10 percent

Setting

Landform: Moraines
Slope: 2 to 8 percent
Elevation: 5,500 to 6,200 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a lower content of clay
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

13—Bata-Waldbillig gravelly silt loams, 4 to 30 percent slopes

Composition

Bata and similar soils: 45 percent
Waldbillig and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Bata—Moraines
- Waldbillig—Moraines

Slope:
- Bata—4 to 30 percent
- Waldbillig—4 to 30 percent

Elevation: 3,800 to 5,000 feet
Mean annual precipitation: 30 to 45 inches

Frost-free period: 40 to 60 days

Component Description

Bata

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

Waldbillig

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Hollandlake and similar soils
- Poorly drained soils
- Upsata soils on terraces

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Beeskove Series

The Beeskove series consists of very deep, well drained soils that formed in colluvium derived from argillite and limestone. These soils are on mountain slopes. Slope is 30 to 80 percent. Elevation is 4,500 to 6,000 feet. The average annual precipitation is 25 to 35 inches, the average annual air temperature is 42 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Typic Eutrochrepts

Typical Pedon

Beeskove gravelly loam, 30 to 60 percent slopes, in a forested area, 900 feet west and 900 feet south of the east quarter corner of sec. 10, T. 12 N., R. 21 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 8 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium and few coarse roots; many very fine and fine pores; 25 percent angular pebbles; neutral; clear wavy boundary.

E/Bw—8 to 20 inches; 75 percent very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist (E part); 25 percent pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist (Bw part); when mixed, texture is very gravelly loam; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium and few coarse roots; many very fine and fine pores; 40 percent angular pebbles; neutral; clear wavy boundary.

Bw—20 to 27 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine and fine pores; 45 percent angular pebbles; neutral; clear wavy boundary.

Bk1—27 to 47 inches; very pale brown (10YR 7/3) extremely gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots and pores; 60 percent angular pebbles and 5 percent angular cobbles; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—47 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; 65 percent angular pebbles and 5 percent angular cobbles; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 8 and 24 inches
Depth to Bk horizon: 20 to 30 inches
Content of clay in the control section: 5 to 15 percent

E horizon
Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 30 percent pebbles
Reaction: pH 6.6 to 7.3

E/Bw horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 55 percent—0 to 10 percent cobbles, 35 to 45 percent pebbles
Reaction: pH 6.6 to 7.3

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles, 35 to 60 percent pebbles
Reaction: pH 6.6 to 7.3

Bk horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 75 percent—5 to 10 percent cobbles, 55 to 60 percent pebbles
Calcium carbonate equivalent: 10 to 15 percent
Reaction: pH 7.9 to 8.4

14—Beeskove gravelly loam, 30 to 60 percent slopes

Composition

Beeskove and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, northeast aspect
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Felan and similar soils
- Repp, cool, soils
- Tevis and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

15—Beeskove-Rock outcrop complex, 50 to 80 percent slopes

Composition

Beeskove and similar soils: 50 percent
Rock outcrop: 30 percent
Inclusions: 20 percent

Setting

Landform:
- Beeskove—Mountains
- Rock outcrop—Mountains

Slope: 50 to 80 percent, southwest aspect
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Beeskove
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.5 inches

Rock outcrop
Definition: Exposures of argillite or limestone bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Felan and similar soils
- Repp, cool, soils
- Tevis and similar soils
- Soils that are shallow over bedrock
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Bigarm Series

The Bigarm series consists of very deep, somewhat excessively drained soils that formed in alluvium and colluvium. These soils are on stream terraces, alluvial fans, hills, and mountains. Slope is 0 to 60 percent. Elevation is 3,000 to 5,200 feet. The average annual precipitation is 14 to 17 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 90 to 110 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Typic Haploxerolls

Typical Pedon

Bigarm gravelly loam, 4 to 15 percent slopes, in an area of rangeland, 1,200 feet north and 100 feet east of the southwest corner of sec. 4, T. 12 N., R. 19 W.

A1—0 to 11 inches; very dark grayish brown (10YR 3/2) gravelly loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; 25 percent pebbles; neutral; clear wavy boundary.

A2—11 to 15 inches; dark grayish brown (10YR 4/2) very gravelly loam, black (10YR 2/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; 40 percent pebbles and 10 percent cobbles; neutral; clear wavy boundary.

Bw1—15 to 21 inches; brown (10YR 5/3) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; 50 percent pebbles and 5 percent cobbles; neutral; clear wavy boundary.

Bw2—21 to 40 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; 50 percent pebbles and 10 percent cobbles; neutral; gradual smooth boundary.

C—40 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; 50 percent pebbles and 25 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between depths of 8 and 24 inches
Mollic epipedon thickness: 8 to 20 inches
Content of rock fragments: 35 to 70 percent in the control section
Content of clay in the control section: 5 to 18 percent
Other features: Mainly argillite and quartzite rock fragments; calcareous material below a depth of 40 inches in some pedons

A horizon
Hue: 7.5YR or 10YR
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 7 to 18 percent
Content of rock fragments: 20 to 60 percent—0 to 20 percent angular cobbles and stones, 10 to 50 percent angular pebbles
Reaction: pH 6.6 to 7.3

Bw horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, fine sandy loam, or sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 35 to 60 percent—0 to 30 percent angular cobbles and stones, 15 to 50 percent angular pebbles
Reaction: pH 6.6 to 7.3

C horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, or loamy sand
Clay content: 5 to 18 percent
Content of rock fragments: 40 to 85 percent—5 to 40 percent angular cobbles and stones, 20 to 60 percent angular pebbles
Reaction: pH 6.6 to 7.3

16—Bigarm gravelly loam, 0 to 4 percent slopes

Composition

Bigarm and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 4 percent
Elevation: 3,000 to 3,600 feet
Mean annual precipitation: 14 to 17 inches
Frost-free period: 90 to 110 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Grantsdale and similar soils
- Poorly drained soils
- Moiese and similar soils
- Soils that have a cobbly surface layer
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

17—Bigarm gravelly loam, 4 to 15 percent slopes

Composition

Bigarm and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Alluvial fans and stream terraces
Slope: 4 to 15 percent
Elevation: 3,200 to 4,800 feet
Mean annual precipitation: 14 to 17 inches
Frost-free period: 90 to 110 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Biglake and similar soils
- Very deep, clayey soils
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

18—Bigarm gravelly loam, 15 to 30 percent slopes

Composition

Bigarm and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 15 to 30 percent
Elevation: 3,200 to 4,800 feet
Mean annual precipitation: 14 to 17 inches
Frost-free period: 90 to 110 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Biglake and similar soils
- Very deep, clayey soils
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

19—Bigarm gravelly loam, 30 to 60 percent slopes

Composition

Bigarm and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 3,200 to 5,200 feet
Mean annual precipitation: 14 to 17 inches
Frost-free period: 90 to 110 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Biglake and similar soils
- Winkler and similar soils
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

20—Bigarm-Rock outcrop complex, 30 to 60 percent slopes

Composition

Bigarm and similar soils: 70 percent
Rock outcrop: 15 percent
Inclusions: 15 percent

Setting

Landform:
- Bigarm—Mountains
- Rock outcrop—Mountains

Slope: 30 to 60 percent
Elevation: 3,200 to 5,000 feet
Mean annual precipitation: 14 to 17 inches
Frost-free period: 90 to 110 days

Component Description

Bigarm
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

Rock outcrop
Definition: Exposures of quartzite or argillite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Biglake and similar soils
- Soils that are 10 to 40 inches deep over bedrock
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Biglake Series

The Biglake series consists of very deep, excessively drained soils that formed in alluvium. These soils are on alluvial fans and stream terraces. Slope is 8 to 30 percent. Elevation is 3,200 to 4,000 feet. The average annual precipitation is 14 to 16 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 90 to 110 days.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Haploxerolls

Typical Pedon

Biglake gravelly sandy loam, 8 to 15 percent slopes, in an area of rangeland, 300 feet east and 2,000 feet north of the southwest corner of sec. 12, T. 12 N., R. 20 W.

A—0 to 9 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many fine pores; 20 percent angular pebbles; neutral (pH 6.8); clear wavy boundary.

Bw—9 to 16 inches; brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; common fine pores; 40 percent angular pebbles and 10 percent cobbles; neutral (pH 6.8); clear wavy boundary.

C—16 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots in the upper part; 55 percent angular pebbles and 10 percent cobbles; neutral (pH 7.0).

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between depths of 12 and 35 inches
Mollic epipedon thickness: 8 to 16 inches
Control section: 2 to 10 percent clay; 35 to 80 percent rock fragments, mainly argillite and quartzite

A horizon
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles, 15 to 25 percent pebbles
Reaction: pH 6.6 to 7.3

Bw horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles, 35 to 45 percent pebbles
Reaction: pH 6.6 to 7.3

C horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 60 to 80 percent—10 to 20 percent cobbles and stones, 50 to 60 percent pebbles
Reaction: pH 6.6 to 7.3

21—Biglake gravelly sandy loam, 8 to 15 percent slopes

Composition

Biglake and similar soils: 90 percent
Inclusions: 10 percent

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Elevation: 3,200 to 4,000 feet
Mean annual precipitation: 14 to 16 inches
Frost-free period: 90 to 110 days

Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bigarm and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

22—Biglake gravelly sandy loam, 15 to 30 percent slopes

Composition

Biglake and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Position on the landform: Risers
Slope: 15 to 30 percent
Elevation: 3,200 to 4,000 feet
Mean annual precipitation: 14 to 16 inches
Frost-free period: 90 to 110 days

Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bigarm and similar soils
- Soils that have a thin surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Bignell Series

The Bignell series consists of very deep, well drained soils that formed in alluvium. These soils are on hills and mountains. Slope is 8 to 60 percent. Elevation is 3,500 to 5,200 feet. The average annual precipitation is 17 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Clayey-skeletal, mixed Typic Eutroboralfs

Typical Pedon

Bignell gravelly loam, 8 to 30 percent slopes, in a forested area, 800 feet north and 300 feet east of the southwest corner of sec. 30, T. 14 N., R. 16 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 11 inches; pinkish gray (7.5YR 7/2) gravelly loam, pinkish gray (7.5YR 6/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and pores; 20 percent pebbles; strongly acid; abrupt wavy boundary.

E/Bt—11 to 15 inches; pinkish gray (7.5YR 7/2) very gravelly loam, pinkish gray (7.5YR 6/2) moist (E part); pinkish gray (7.5YR 6/2) very gravelly clay loam, brown (7.5YR 5/2) moist (Bt part); when mixed, texture is very gravelly loam; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine pores; 45 percent pebbles; strongly acid; gradual wavy boundary.

Bt1—15 to 35 inches; light brown (7.5YR 6/4) very gravelly clay, brown (7.5YR 5/4) moist; strong fine and medium angular blocky structure; very hard, firm, sticky and very plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores; common moderately thick clay films on faces of peds and on pebbles; 45 percent pebbles; strongly acid; clear wavy boundary.

Bt2—35 to 60 inches; light brown (7.5YR 6/4) very gravelly clay, strong brown (7.5YR 5/6) moist;

strong fine and medium angular blocky structure; very hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and fine pores; common moderately thick reddish yellow (7.5YR 7/8) and brown (7.5YR 5/4) clay films on faces of peds and on pebbles; 45 percent pebbles; medium acid.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 4 and 12 inches
Content of clay in the control section: 35 to 60 percent

E horizon
Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 10 to 30 percent
Content of rock fragments: 15 to 60 percent—0 to 30 percent cobbles or stones, 10 to 30 percent pebbles
Surface stones: 0 to 3 percent of the surface covered by stones
Reaction: pH 5.1 to 6.5

E/Bt horizon
Hue: E part—7.5YR or 10YR; Bt part—7.5YR or 10YR
Value: E part—6 or 7 dry and 5 or 6 moist; Bt part—5 to 7 dry
Chroma: E part—2 or 3; Bt part—2 to 6
Texture: Loam, sandy clay loam, or clay loam
Clay content: 10 to 35 percent
Content of rock fragments: 25 to 60 percent—0 to 25 percent cobbles, 15 to 55 percent pebbles
Reaction: pH 5.1 to 6.5

Bt horizon
Hue: 5YR, 7.5YR, or 10YR
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 2 to 6
Texture: Clay, sandy clay, or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 35 to 60 percent—0 to 30 percent cobbles, 15 to 45 percent pebbles
Reaction: pH 5.1 to 6.5; ranges to pH 7.8 below a depth of 40 inches

23—Bignell gravelly loam, 8 to 30 percent slopes

Composition

Bignell and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 8 to 30 percent
Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 17 to 24 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Crow and similar soils
- Greenough and similar soils
- Shooflin and similar soils
- Winkler, cool, soils
- Soils that have a stony surface layer
- Soils that support western larch and grand fir

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

24—Bignell-Winkler, cool, complex, 30 to 60 percent slopes

Composition

Bignell and similar soils: 55 percent
Winkler and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:
- Bignell—Mountains
- Winkler—Mountains

Slope:
- Bignell—30 to 60 percent, northeast aspect
- Winkler—30 to 60 percent, northeast aspect

Elevation: 4,000 to 5,200 feet
Mean annual precipitation: 17 to 24 inches
Frost-free period: 60 to 90 days

Component Description

Bignell
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.6 inches

Winkler
Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Crow and similar soils
- Shooflin and similar soils
- Tevis and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

25—Bignell, warm-Winkler complex, 30 to 60 percent slopes

Composition

Bignell and similar soils: 55 percent
Winkler and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:
- Bignell—Mountains
- Winkler—Mountains

Slope:
- Bignell—30 to 60 percent, southwest aspect
- Winkler—30 to 60 percent, southwest aspect

Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 17 to 24 inches
Frost-free period: 60 to 90 days

Component Description

Bignell
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.4 inches

Winkler
Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Crow and similar soils
- Shooflin and similar soils
- Soils that support western larch
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Borohemists

Borohemists consist of very deep, poorly drained or very poorly drained soils that formed in organic deposits of mosses, rushes, grasses, sedges, cattails, trees, and other woody plants over mineral soil deposits. The plant material is in various stages of decomposition. Borohemists are in closed depressions in glaciated valleys and along streams. Slope is 0 to 2 percent. Elevation is 3,800 to 4,000 feet. The average annual precipitation is 22 to 30 inches, the average annual air temperature is 39 to 41 degrees F, and the frost-free season is 40 to 60 days.

Typical Pedon

Borohemists in an area of native grasses, sedges, rushes, and other water-tolerant plants, 500 feet east of the southwest corner of sec. 19, T. 20 N., R. 16 W.

Oe1—0 to 6 inches; hemic material, black (N 2/0) moist; about 60 percent fiber; weak thick platy structure; nonsticky; medium acid; clear smooth boundary.

Oe2—6 to 28 inches; hemic material, reddish brown (5YR 4/4) moist; about 50 percent fiber; weak thick platy structure; nonsticky; 80 percent herbaceous fiber and 20 percent mainly wood fiber; medium acid; abrupt wavy boundary.

Cg—28 to 60 inches; very fine sandy loam, light brownish gray (10YR 6/2) moist; common medium distinct light brown (7.5YR 6/4) and greenish gray (5G 6/1) mottles; massive; soft, friable, nonsticky and nonplastic; slightly acid.

Range in Characteristics

Thickness of organic material: 16 to 40 inches
Texture (mineral soil): Sandy loam to silty clay loam
Seasonal high water table: At or near the surface

26—Borohemists, 0 to 2 percent slopes

Composition

Borohemists and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Closed depressions
Slope: 0 to 2 percent
Elevation: 3,800 to 4,000 feet
Mean annual precipitation: 22 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Depth class: Very deep (more than 60 inches)
Dominant parent material: Peat
Flooding: None
Kind of water table: Apparent
Duration of ponding: Long
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Somewhat poorly drained soils
- Areas of soils that are occasionally flooded

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Chickaman Series

The Chickaman series consists of very deep, somewhat excessively drained soils that formed in material derived from micaceous schist. The surface layer of these soils has a high content of volcanic ash. The soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 4,500 to 6,000 feet. The average annual precipitation is 37 to 42 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Coarse-silty, micaceous Andic Cryochrepts

Typical Pedon

Chickaman silt loam, 8 to 30 percent slopes, in a forested area, 1,200 feet north of the southwest corner of sec. 12, T. 11 N., R. 22 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

Bs—0 to 9 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and few coarse roots; 5 percent hard micaceous pebbles and 5 percent soft micaceous pebbles; slightly acid; clear wavy boundary.

2E—9 to 18 inches; light gray (10YR 7/2) gravelly silt loam, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and

few coarse roots; 20 percent hard pebbles; slightly acid; abrupt wavy boundary.

2E and Bt—18 to 30 inches; 75 percent light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist (E part); 25 percent brown (10YR 5/3) lamellae of silt loam about ⅛ to ½ inch thick, dark brown (10YR 4/3) moist (Bt part); weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; 5 percent hard micaceous pebbles and 15 percent soft micaceous pebbles; slightly acid; abrupt wavy boundary.

2BC—30 to 60 inches; light yellowish brown (10YR 6/4) very gravelly silt loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; 5 percent hard micaceous pebbles and 40 percent soft micaceous pebbles; slightly acid.

Range in Characteristics

Soil temperature: 39 to 43 degrees F
Moisture control section: Between depths of 4 and 12 inches
Control section: 5 to 10 percent clay and more than 40 percent mica, by weight

Bs horizon
Value: 5 or 6 dry
Chroma: 3 or 4
Clay content: 5 to 8 percent
Content of rock fragments: 0 to 25 percent—0 to 10 percent hard pebbles, 0 to 15 percent soft micaceous pebbles
Moist bulk density: 0.95 g/cc or less
Reaction: pH 6.1 to 6.5

2E horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 5 to 10 percent
Content of rock fragments: 15 to 35 percent— 0 to 10 percent hard pebbles
Reaction: pH 6.1 to 6.5

2E and Bt horizon
Value: E part—6 or 7 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—3 or 4
Clay content: 5 to 10 percent; less than 3 percent increase in clay in lamellae
Content of rock fragments: 15 to 35 percent—0 to 10 percent hard pebbles, 15 to 25 percent soft micaceous pebbles
Reaction: pH 6.1 to 6.5

2BC horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 75 percent—0 to 10 percent hard cobbles and pebbles, 35 to 65 percent soft micaceous pebbles and cobbles
Reaction: pH 6.1 to 6.5

27—Chickaman silt loam, 8 to 30 percent slopes

Composition

Chickaman and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 37 to 42 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 8.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway and similar soils
- Lantern and similar soils
- Petty and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

28—Chickaman silt loam, 30 to 60 percent slopes

Composition

Chickaman and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 37 to 42 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 8.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway and similar soils
- Lantern and similar soils
- Petty and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Coerock Series

The Coerock series consists of shallow, well drained soils that formed in volcanic ash over argillite or quartzite bedrock. These soils are in cirque basins and on mountains. Slope is 4 to 80 percent. Elevation is 6,500 to 8,000 feet. The average annual precipitation is 50 to 80 inches, the average annual air temperature is 33 to 36 degrees F, and the frost-free season is 30 to 40 days.

Taxonomic Class: Medial-skeletal Lithic Cryandepts

Typical Pedon

Coerock very gravelly silt loam, in an area of Coerock-Rock outcrop complex, 4 to 30 percent slopes; in a forested area, 2,000 feet west and 1,000 feet south of the northeast corner of sec. 2, T. 17 N., R. 17 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

Bs1—0 to 15 inches; reddish yellow (7.5YR 6/6) very gravelly silt loam, strong brown (7.5YR 4/6) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and few coarse roots; 40 percent pebbles; medium acid; gradual wavy boundary.

Bs2—15 to 18 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; 35 percent pebbles and 10 percent cobbles; medium acid; abrupt wavy boundary.

R—18 inches; fractured quartzite bedrock.

Range in Characteristics

Soil temperature: 35 to 38 degrees F
Moisture control section: Between depths of 8 and 24 inches
Depth to bedrock: 14 to 20 inches
Base saturation: Less than 60 percent

Bs1 horizon

Hue: 7.5YR or 10YR
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 3 to 6
Clay content: 7 to 15 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles, 35 to 50 percent pebbles
Moist bulk density: Less than 0.85 g/cc
Reaction: pH 5.6 to 6.5

Bs2 horizon

Hue: 7.5YR or 10YR
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 3 to 6
Texture: Loam or silt loam
Clay content: 7 to 15 percent
Content of rock fragments: 35 to 50 percent—5 to 15 percent cobbles, 30 to 45 percent pebbles
Reaction: pH 5.6 to 6.5
Moist bulk density: Less than 0.85 g/cc

29—Coerock-Rock outcrop complex, 4 to 30 percent slopes

Composition

Coerock and similar soils: 45 percent
Rock outcrop: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Coerock—Cirque basins
- Rock outcrop—Cirque basins

Slope:
- Coerock—4 to 30 percent
- Rock outcrop—4 to 30 percent

Elevation: 6,500 to 8,000 feet
Mean annual precipitation: 50 to 80 inches
Frost-free period: 30 to 40 days

Component Description

Coerock
Surface layer texture: Very gravelly silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.0 inches

Rock outcrop
Definition: Exposures of argillite or quartzite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Very deep, loamy soils
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

30—Coerock-Rock outcrop complex, 50 to 80 percent slopes

Composition

Coerock and similar soils: 45 percent
Rock outcrop: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Coerock—Mountains
- Rock outcrop—Mountains

Slope: 50 to 80 percent
Elevation: 6,500 to 8,000 feet
Mean annual precipitation: 50 to 80 inches
Frost-free period: 30 to 40 days

Component Description

Coerock
Surface layer texture: Very gravelly silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.0 inches

Rock outcrop
Definition: Exposures of argillite or quartzite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Very deep, loamy soils
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Courville Series

The Courville series consists of very deep, well drained soils that formed in alpine till. The surface layer

of these soils has a high content of volcanic ash. These soils are on moraines and mountains. Slope is 8 to 60 percent. Elevation is 3,800 to 5,000 feet. The average annual precipitation is 25 to 35 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Andic Dystric Eutrochrepts

Typical Pedon

Courville gravelly silt loam, 8 to 30 percent slopes, in a forested area, 2,400 feet west and 100 feet north of the southeast corner of sec. 11, T. 21 N., R. 17 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

Bs—0 to 10 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; very fine pores; 20 percent pebbles; slightly acid; clear smooth boundary.

2E—10 to 27 inches; light brownish gray (10YR 6/2) very gravelly fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine pores; 40 percent pebbles and 5 percent cobbles; slightly acid; clear wavy boundary.

2E/Bw—27 to 45 inches; 80 percent light brownish gray (10YR 6/2) very gravelly fine sandy loam, brown (10YR 4/3) moist (E part); 20 percent light yellowish brown (10YR 6/4) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist (Bw part); weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine pores; 40 percent pebbles and 10 percent cobbles; neutral; gradual wavy boundary.

2Bw/E—45 to 60 inches; 75 percent light yellowish brown (10YR 6/4) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist (Bw part); 25 percent light brownish gray (10YR 6/2) very gravelly fine sandy loam, brown (10YR 4/3) moist (E part); weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine pores; 40 percent pebbles and 10 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 40 to 45 degrees F
Moisture control section: Between depths of 8 and 24 inches

Bs horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3 or 4
Clay content: 7 to 15 percent
Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles and stones, 0 to 30 percent pebbles
Bulk density: 1.0 g/cc or less
Reaction: pH 5.6 to 6.5

2E horizon
Hue: 7.5YR or 10YR
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, fine sandy loam, or silt loam
Clay content: 5 to 18 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles and stones, 25 to 55 percent pebbles
Reaction: pH 5.6 to 7.3

2E/Bw horizon
Hue: E part—7.5YR or 10YR; B part—7.5YR or 10YR
Value: E part—6 to 8 dry and 4 to 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—3 or 4
Texture: Loam, silt loam, fine sandy loam, or sandy loam
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles and stones, 25 to 50 percent pebbles
Reaction: pH 5.6 to 7.3

2Bw/E horizon
Hue: B part—7.5YR or 10YR; E part—7.5YR or 10YR
Value: B part—5 or 6 dry and 4 or 5 moist; E part—6 to 8 dry and 4 to 6 moist
Chroma: B part—3 or 4; E part—2 or 3
Texture: Loam, silt loam, fine sandy loam, or sandy loam
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles and stones, 25 to 50 percent pebbles
Reaction: pH 5.6 to 7.3

31—Courville gravelly silt loam, 8 to 30 percent slopes

Composition

Courville and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 8 to 30 percent
Elevation: 3,800 to 5,000 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Rumblecreek and similar soils
- Poorly drained soils
- Winfall and similar soils
- Glaciercreek soils on terraces

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

32—Courville-Mitten gravelly silt loams, 30 to 60 percent slopes

Composition

Courville and similar soils: 45 percent
Mitten and similar soils: 40 percent
Inclusions: 15 percent

Setting

Landform:
- Courville—Mountains
- Mitten—Mountains

Slope:
- Courville—30 to 60 percent
- Mitten—30 to 60 percent

Elevation: 4,200 to 5,000 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Courville
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.1 inches

Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winfall and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Crow Series

The Crow series consists of very deep, well drained soils that formed in alluvium. These soils are on hills. Slope is 4 to 15 percent. Elevation is 3,500 to 4,500 feet. The average annual precipitation is 16 to 22 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Fine, mixed Typic Eutroboralfs

Typical Pedon

Crow silt loam, 4 to 15 percent slopes, in a forested

area, 200 feet north and 100 feet east of the southwest corner of sec. 22, T. 13 N., R. 15 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 1 inch; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; strong very thin platy structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 5 percent pebbles; medium acid; abrupt smooth boundary.

E2—1 to 4 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak thin platy structure; slightly hard, firm, slightly sticky and plastic; many very fine, fine, medium, and coarse roots; many very fine pores; 10 percent pebbles; medium acid; abrupt smooth boundary.

Bt/E—4 to 10 inches; yellowish brown (10YR 5/4) silty clay loam, brown (10YR 4/3) moist (Bt part); light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist (E part); strong medium subangular blocky structure; hard, firm, slightly sticky and plastic; many very fine, fine, medium, and coarse roots; many very fine pores; common moderately thick clay films lining pores; 10 percent pebbles; medium acid; clear smooth boundary.

Bt1—10 to 35 inches; yellowish brown (10YR 5/4) silty clay, brown (10YR 4/3) moist; strong medium prismatic structure parting to moderate coarse subangular blocky; very hard, very firm, sticky and plastic; common very fine, fine, medium, and coarse roots; many very fine pores; many moderately thick clay films on faces of peds; 10 percent pebbles; slightly acid; clear smooth boundary.

Bt2—35 to 48 inches; yellowish brown (10YR 5/4) silty clay, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, sticky and plastic; few very fine and fine roots; common very fine pores; many thick clay films lining pores; 10 percent pebbles; slightly acid; gradual smooth boundary.

BC—48 to 60 inches; very pale brown (10YR 7/4) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate very fine angular blocky structure; slightly hard, firm, sticky and plastic; few fine and very fine roots; many very fine pores; many moderately thick clay films; 10 percent pebbles; slightly acid.

Range in Characteristics

E horizon

Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles, 0 to 25 percent pebbles
Reaction: pH 5.6 to 6.5

Bt/E horizon

Hue: 10YR or 2.5Y
Value: B part—5 or 6 dry and 4 or 5 moist; E part—6 to 8 dry and 5 or 6 moist
Chroma: B part—2 to 4; E part—2 or 3
Texture: Silty clay loam, clay loam, loam, or silt loam
Clay content, mixed: 20 to 40 percent
Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles, 0 to 25 percent pebbles
Reaction: pH 5.6 to 6.5

Bt horizon

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Silty clay, clay, sandy clay, or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles, 0 to 25 percent pebbles
Reaction: pH 6.1 to 7.3

BC horizon

Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Sandy clay loam, clay loam, loam, or sandy loam
Clay content: 15 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles, 5 to 25 percent pebbles
Reaction: pH 6.1 to 7.8

33—Crow silt loam, 4 to 15 percent slopes

Composition

Crow and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 4 to 15 percent
Elevation: 3,500 to 4,500 feet
Mean annual precipitation: 16 to 22 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 9.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bignell and similar soils
- Greenough and similar soils
- Lubrecht and similar soils
- Shooflin and similar soils
- Winkler, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Desmet Series

The Desmet series consists of very deep, well drained soils that formed in alluvium. These soils are on stream terraces. Slope is 0 to 2 percent. Elevation is 2,800 to 3,500 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 43 to 45 degrees F, and the frost-free season is 105 to 120 days.

Taxonomic Class: Coarse-silty, mixed, frigid Calciorthidic Haploxerolls

Typical Pedon

Desmet loam, 0 to 2 percent slopes, in an area of cropland, 600 feet south and 120 feet east of the northwest corner of sec. 34, T. 12 N., R. 20 W.

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common fine pores; neutral; abrupt smooth boundary.

A—7 to 15 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots and pores; mildly alkaline; clear wavy boundary.

Bk—15 to 24 inches; light gray (2.5Y 7/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots and pores; common soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

BC—24 to 60 inches; light gray (2.5Y 7/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots and pores; disseminated lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F
Moisture control section: Between depths of 4 and 12 inches
Mollic epipedon thickness: 7 to 15 inches
Content of clay in the control section: 10 to 18 percent
Depth to Bk horizon: 11 to 20 inches

Ap horizon
Value: 2 or 3 moist
Clay content: 10 to 18 percent
Reaction: pH 6.6 to 7.8

A horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Loam or very fine sandy loam
Clay content: 10 to 18 percent
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR or 2.5Y
Value: 5 to 8 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loam, silt loam, or very fine sandy loam
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 8 to 15 percent
Reaction: pH 7.4 to 8.4

BC horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 0 to 15 percent pebbles
Calcium carbonate equivalent: 5 to 12 percent
Reaction: pH 7.4 to 8.4

34—Desmet loam, 0 to 2 percent slopes

Composition

Desmet and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 2,800 to 3,500 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days
Note: In areas outside the Missoula Valley, this soil has a shorter frost-free period.

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 9.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Alberton and similar soils
- Grantsdale and similar soils
- Moiese and similar soils
- Somewhat poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Elkner Series

The Elkner series consists of very deep, somewhat excessively drained soils that formed in igneous colluvium. These soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 4,500 to 6,200 feet. The average annual precipitation is 20 to 30 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Coarse-loamy, mixed Typic Cryochrepts

Typical Pedon

Elkner sandy loam, in an area of Elkner-Ovando complex, 8 to 30 percent slopes; in a forested area, 1,000 feet east and 800 feet north of the south quarter corner of sec. 34, T. 13 N., R. 14 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 7 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and few coarse roots; 5 percent pebbles; slightly acid; clear wavy boundary.

E2—7 to 20 inches; light yellowish brown (10YR 6/4) coarse sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; 5 percent pebbles; medium acid; clear wavy boundary.

E and Bt—20 to 36 inches; 80 percent light yellowish brown (10YR 6/4) coarse sandy loam, brown (10YR 4/3) moist (E part); 20 percent yellowish brown (10YR 5/4) coarse sandy loam lamellae that are about ⅛ to ½ inch thick and have a combined thickness of 2 to 4 inches, dark yellowish brown (10YR 4/4) moist (Bt part); weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; 10 percent pebbles; medium acid; gradual wavy boundary.

BC—36 to 60 inches; light yellowish brown (10YR 6/4) gravelly loamy coarse sand, brown (10YR 4/3) moist; massive; loose, nonsticky and nonplastic; 20 percent pebbles; medium acid.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between depths of 4 and 12 inches

E horizon
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 0 to 35 percent—0 to 35 percent cobbles, stones, or boulders and 0 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

E and Bt horizon
Hue: E part—10YR; B part—10YR or 2.5Y
Value: E part—6 or 7 dry and 4 or 5 moist; B part—4 or 5 dry or moist
Chroma: E part—2 to 4; B part—3 or 4
Texture: Coarse sandy loam or sandy loam
Clay content: 5 to 10 percent; less than 3 percent increase in clay in lamellae
Content of rock fragments: 0 to 20 percent—0 to 15 percent cobbles, stones, or boulders and 5 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

BC horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loamy coarse sand or coarse sandy loam
Clay content: 0 to 5 percent
Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles and stones, 5 to 20 percent pebbles
Reaction: pH 5.6 to 7.3

35—Elkner-Ovando complex, 8 to 30 percent slopes

Composition

Elkner and similar soils: 65 percent
Ovando and similar soils: 20 percent
Inclusions: 15 percent

Setting

Landform:
- Elkner—Mountains
- Ovando—Mountains

Slope:
- Elkner—8 to 30 percent
- Ovando—8 to 30 percent

Elevation: 4,500 to 6,200 feet
Mean annual precipitation: 20 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Elkner
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.7 inches

Ovando
Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Areas of rock outcrop
- Sandy soils that are shallow over bedrock
- Soils that have a subsoil of sandy clay loam
- Soils that have volcanic ash in the surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:
- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Evaro Series

The Evaro series consists of very deep, somewhat excessively drained soils that formed in colluvium derived from argillite and quartzite. The surface layer of these soils has a high content of volcanic ash. The soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 4,500 to 6,000 feet. The average annual precipitation is 20 to 30 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Typic Cryochrepts

Typical Pedon

Evaro gravelly loam, 30 to 60 percent slopes, in a forested area, 660 feet west and 1,050 feet north of the southeast corner of sec. 3, T. 12 N., R. 17 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
A—0 to 4 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 25 percent pebbles; slightly acid; clear wavy boundary.
2E—4 to 16 inches; pinkish gray (7.5YR 6/2) very gravelly sandy loam, brown (7.5YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 50 percent pebbles, 10 percent cobbles; slightly acid; gradual smooth boundary.
2E and Bt—16 to 60 inches; pinkish gray (7.5YR 6/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist (E part); brown (7.5YR 5/4) extremely gravelly

sandy loam lamellae, brown (7.5YR 4/4) moist (Bt part); massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; 60 percent pebbles, 10 percent cobbles; slightly acid.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between depths of 8 and 24 inches

A horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 to 5
Content of glass: 35 to 60 percent
Clay content: 7 to 15 percent
Content of rock fragments: 15 to 70 percent—0 to 20 percent stones, 0 to 25 percent cobbles, 15 to 25 percent pebbles
Reaction: pH 5.6 to 6.5

2E horizon
Hue: 10YR or 7.5YR
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 40 to 80 percent—5 to 30 percent cobbles, 35 to 50 percent pebbles
Reaction: pH 5.6 to 7.3

2E and Bt horizon
Hue: E part—10YR or 7.5YR; B part—10YR or 7.5YR
Value: E part—6 or 7 dry and 4 to 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—3 or 4
Texture: Loam or sandy loam
Clay content: 5 to 18 percent; less than 3 percent clay increase in lamellae
Content of rock fragments: 60 to 80 percent—5 to 15 percent cobbles, 55 to 65 percent pebbles
Reaction: pH 5.6 to 7.3

36—Evaro gravelly loam, 8 to 30 percent slopes

Composition

Evaro and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 20 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway and similar soils
- Mitten and similar soils
- Tevis and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

37—Evaro gravelly loam, 30 to 60 percent slopes

Composition

Evaro and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, northeast aspect
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 20 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None

Available water capacity to 60 inches or root-limiting layer: Mainly 3.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway and similar soils
- Mitten and similar soils
- Tevis and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Felan Series

The Felan series consists of very deep, well drained soils that formed in colluvium derived from limestone or argillite. The surface layer of these soils has a high content of volcanic ash. The soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 4,500 to 8,000 feet. The average annual precipitation is 30 to 60 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Andic Cryochrepts

Typical Pedon

Felan gravelly silt loam, 30 to 60 percent slopes, in a forested area, 1,500 feet north and 1,500 feet west of the southeast corner of sec. 18, T. 15 N., R. 16 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 3 inches; light gray (10YR 7/2) gravelly silt loam, grayish brown (10YR 5/2) moist; strong fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 15 percent angular pebbles; medium acid; clear wavy boundary.

Bs—3 to 8 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 25 percent angular pebbles; medium acid; clear wavy boundary.

2E—8 to 23 inches; light gray (2.5Y 7/2) very gravelly silt loam, light brownish gray (2.5Y 6/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; many very fine and fine pores; 45 percent angular pebbles; medium acid; clear smooth boundary.

2Bt1—23 to 33 inches; pale yellow (2.5Y 7/4) very gravelly silt loam, light yellowish brown (2.5Y 6/4) moist; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; many very fine and fine pores; common faint clay bridging and coatings on sand grains; 40 percent angular pebbles; neutral; clear smooth boundary.

2Bt2—33 to 49 inches; light yellowish brown (2.5Y 6/4) very gravelly loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine and fine pores; common faint clay bridging and coatings on sand grains; 40 percent angular pebbles; mildly alkaline; gradual smooth boundary.

2Bt3—49 to 60 inches; pale yellow (2.5Y 7/4) very gravelly loam, light olive brown (2.5Y 5/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine pores; common faint clay bridging and coatings on sand grains; 40 percent angular pebbles, 5 percent cobbles; moderately alkaline.

Range in Characteristics

Soil temperature: 39 to 44 degrees F

Moisture control section: Between depths of 8 and 24 inches

Control section: 8 to 18 percent clay; 40 to 60 percent silt; less than 45 percent total sand; less than 35 percent sand coarser than very fine sand

Depth to carbonates: Commonly below a depth of 60 inches; as shallow as 40 inches in some pedons

E horizon

Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent angular cobbles and stones, 15 to 30 percent angular pebbles
Moist bulk density: 1.0 g/cc or less

Reaction: pH 5.1 to 6.0

Bs horizon

Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6
Texture: Silt loam or loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent angular cobbles and stones, 15 to 30 percent angular pebbles
Moist bulk density: 1.0 g/cc or less
Reaction: pH 5.1 to 6.0

2E horizon

Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Silt loam or loam
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 70 percent—0 to 10 percent angular cobbles and stones, 35 to 60 percent angular pebbles
Reaction: pH 5.1 to 7.3

2Bt horizon

Hue: 2.5Y or 10YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3 to 6
Texture: Loam or silt loam
Clay content: 8 to 20 percent
Content of rock fragments: 40 to 75 percent—0 to 10 percent angular cobbles and stones, 40 to 65 percent angular pebbles
Reaction: pH 6.6 to 8.4

38—Felan gravelly silt loam, 8 to 30 percent slopes

Composition

Felan and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,500 to 6,500 feet
Mean annual precipitation: 30 to 50 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Felan, cool, soils
- Holloway and similar soils
- Jimlake and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

39—Felan gravelly silt loam, 30 to 60 percent slopes

Composition

Felan and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,500 to 6,500 feet
Mean annual precipitation: 30 to 50 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Felan, cool, soils
- Holloway and similar soils
- Jimlake and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

40—Felan gravelly silt loam, cool, 8 to 30 percent slopes

Composition

Felan and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 6,000 to 8,000 feet
Mean annual precipitation: 40 to 60 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway, cool, soils
- Soils that are shallow over bedrock
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

41—Felan gravelly silt loam, cool, 30 to 60 percent slopes

Composition

Felan and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 6,000 to 8,000 feet
Mean annual precipitation: 40 to 60 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway, cool, soils
- Soils that are shallow over bedrock
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Glaciercreek Series

The Glaciercreek series consists of very deep, excessively drained soils that formed in glacial outwash. The upper layers of these soils have a high content of volcanic ash. The soils are on outwash plains, stream terraces, and hills. Slope is 0 to 20 percent. Elevation is 3,600 to 4,600 feet. The average annual precipitation is 22 to 30 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Sandy-skeletal, mixed, frigid Andic Dystric Eutrochrepts

Typical Pedon

Glaciercreek gravelly silt loam, 0 to 4 percent slopes, in a forested area, 2,640 feet north and 1,200 feet west of the southeast corner of sec. 12, T. 20 N., R. 17 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

A—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; 20 percent pebbles; medium acid; clear smooth boundary.

Bw—2 to 14 inches; very pale brown (10YR 7/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; 20 percent pebbles; medium acid; clear smooth boundary.

2C1—14 to 44 inches; light yellowish brown (10YR 6/4) extremely gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 60 percent pebbles, 5 percent cobbles; medium acid; gradual smooth boundary.

2C2—44 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly coarse sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 75 percent pebbles, 10 percent cobbles; slightly acid.

Range in Characteristics

Soil temperature: 40 to 45 degrees F
Moisture control section: Between depths of 12 and 35 inches
Depth to 2C horizon: 10 to 18 inches
Base saturation: 60 to 85 percent
Content of clay in the control section: 2 to 12 percent

A horizon
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 to 3
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles and stones, 15 to 25 percent pebbles
Moist bulk density: Less than 0.95 g/cc
Reaction: pH 5.6 to 7.3

Bw horizon
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Silt loam, sandy loam, or loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles and stones, 15 to 25 percent pebbles
Moist bulk density: Less than 0.95 g/cc
Reaction: pH 5.6 to 7.3

2C horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loamy sand, loamy coarse sand, coarse sand, or sand
Clay content: 0 to 10 percent
Content of rock fragments: 60 to 90 percent—5 to 30 percent cobbles and stones, 55 to 75 percent pebbles
Reaction: pH 5.6 to 7.3

42—Glaciercreek gravelly silt loam, 0 to 4 percent slopes

Composition

Glaciercreek and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Outwash plains
Slope: 0 to 4 percent
Elevation: 3,600 to 4,400 feet
Mean annual precipitation: 22 to 30 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Glacial outwash
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Courville and similar soils
- Winfall and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Glaciercreek Variant

The Glaciercreek variant consists of very deep, somewhat excessively drained soils that formed in alluvium over glacial outwash. These soils are on hills. Slope is 4 to 20 percent. Elevation is 3,800 to 4,600 feet. The average annual precipitation is 22 to 30 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Coarse-loamy, mixed, frigid Dystric Eutrochrepts

Typical Pedon

Glaciercreek variant, in an area of Glaciercreek variant-Glaciercreek complex, 4 to 20 percent slopes; in a forested area, 2,000 feet north and 700 feet west of the southeast corner of sec. 30, T. 15 N., R. 14 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

E—0 to 9 inches; pinkish gray (7.5YR 6/2) fine sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; neutral; clear wavy boundary.

Bw1—9 to 20 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; neutral; clear irregular boundary.

Bw2—20 to 32 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and pores; neutral; clear wavy boundary.

2C—32 to 60 inches; pinkish gray (7.5YR 7/2) extremely cobbly fine sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots and pores; 60 percent cobbles, 20 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 40 to 45 degrees F
Moisture control section: Between depths of 8 and 24 inches
Base saturation: 60 to 85 percent

E horizon
Clay content: 5 to 15 percent
Reaction: pH 5.6 to 7.3

Bw horizon
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Silt loam, sandy loam, or loam
Clay content: 5 to 15 percent
Reaction: pH 5.6 to 7.3

2C horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 5 to 15 percent
Content of rock fragments: 40 to 90 percent—20 to 60 percent cobbles, 20 to 30 percent pebbles
Reaction: pH 5.6 to 7.3

43—Glaciercreek variant-Glaciercreek complex, 4 to 20 percent slopes

Composition

Glaciercreek variant and similar soils: 60 percent
Glaciercreek and similar soils: 25 percent
Inclusions: 15 percent

Setting

Landform:
- Glaciercreek variant—Hills
- Glaciercreek—Hills

Position on the landform:
- Glaciercreek variant—Foot slopes and toe slopes
- Glaciercreek—Back slopes and shoulders

Slope:
- Glaciercreek variant—4 to 20 percent
- Glaciercreek—4 to 20 percent

Elevation: 3,800 to 4,600 feet
Mean annual precipitation: 22 to 30 inches
Frost-free period: 60 to 90 days

Component Description

Glaciercreek variant
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.1 inches

Glaciercreek
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Glacial outwash
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Very deep, sandy soils
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Grantsdale Series

The Grantsdale series consists of very deep, well drained soils that formed in alluvium. These soils are on stream terraces. Slope is 0 to 2 percent. Elevation is 2,800 to 3,500 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 43 to 45 degrees F, and the frost-free season is 105 to 120 days.

Taxonomic Class: Coarse-silty over sandy or sandy-skeletal, mixed, frigid Calciorthidic Haploxerolls

Typical Pedon

Grantsdale loam, 0 to 2 percent slopes, in an irrigated pasture, 2,450 feet south of the northeast corner of sec. 35, T. 12 N., R. 20 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; common fine and medium pores; neutral; clear smooth boundary.

Bw—9 to 17 inches; pale brown (10YR 6/3) loam, brown (10Y 5/3) moist; weak fine and moderate subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common fine pores; neutral; gradual smooth boundary.

Bk—17 to 32 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear wavy boundary.

2Ck—32 to 36 inches; light gray (2.5Y 7/2) very gravelly loamy sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; 50 percent pebbles, 10 percent cobbles; thin lime coatings on undersides of pebbles; strongly effervescent; moderately alkaline; gradual smooth boundary.

2C—36 to 60 inches; light brownish gray (10YR 6/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; 50 percent pebbles, 10 percent cobbles; slightly effervescent; mildly alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F
Moisture control section: Between depths of 8 and 24 inches
Mollic epipedon thickness: 7 to 16 inches
Content of clay in the control section: 6 to 12 percent
Depth to Bk horizon: 14 to 20 inches
Base saturation: 50 to 100 percent

Ap horizon
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.3

Bw horizon
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Loam, very fine sandy loam, or silt loam
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.3

Bk horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loam, very fine sandy loam, or silt loam
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

2Ck and 2C horizons
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 70 percent—5 to 20 percent cobbles, 30 to 50 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

44—Grantsdale loam, 0 to 2 percent slopes

Composition

Grantsdale and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 2,800 to 3,500 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days
Note: In areas outside the Missoula Valley, this soil has a shorter frost-free period.

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Alberton and similar soils
- Desmet and similar soils
- Moiese and similar soils
- Somewhat poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Grassvalley Series

The Grassvalley series consists of very deep, well drained soils that formed in glaciolacustrine deposits. These soils are on lake plains and hills. Slope is 0 to 30 percent. Elevation is 3,200 to 3,800 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 43 to 45 degrees F, and the frost-free season is 105 to 120 days.

Taxonomic Class: Fine, illitic, frigid Typic Haploxeralfs

Typical Pedon

Grassvalley silty clay loam, 0 to 4 percent slopes, in an area of hayland, 800 feet east and 100 feet south of the northwest corner of sec. 14, T. 13 N., R. 20 W.

Ap—0 to 9 inches; pinkish gray (7.5YR 6/2) silty clay loam, brown (7.5YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; many very fine roots and pores; neutral; abrupt smooth boundary.

Bt1—9 to 13 inches; light reddish brown (5YR 6/3) clay, reddish brown (5YR 4/3) moist; strong medium angular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots; many very fine pores; common thin clay films on faces of peds and in pores; neutral; gradual wavy boundary.

Bt2—13 to 21 inches; light reddish brown (5YR 6/4) clay, reddish brown (5YR 4/4) moist; strong moderate and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots and pores; common thin clay films on faces of peds and in pores; mildly alkaline; gradual wavy boundary.

Btk—21 to 28 inches; pink (5YR 7/3) clay, reddish brown (5YR 5/4) moist; strong fine angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots and pores; few thin clay films on faces of peds and in pores; common fine soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

BC—28 to 37 inches; pink (5YR 7/3) clay, reddish brown (5YR 5/4) moist; weak coarse angular blocky structure parting to varves 1/8 to 1/2 inch thick; hard,

firm, sticky and plastic; few very fine roots and pores; strongly effervescent; moderately alkaline; gradual wavy boundary.

C—37 to 60 inches; light reddish brown (5YR 6/4) clay, reddish brown (5YR 5/3) moist; massive; distinct varves ½ to 1 inch thick; hard, firm, sticky and plastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F
Moisture control section: Between depths of 4 and 12 inches
Content of clay in the control section: 40 to 60 percent
Depth to Btk horizon: 15 to 26 inches

Ap horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 30 to 40 percent
Reaction: pH 6.6 to 7.8

Bt horizon
Hue: 5YR or 7.5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Reaction: pH 6.6 to 8.4

Btk horizon
Hue: 5YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

BC horizon
Hue: 5YR or 7.5YR
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Clay, silty clay, or silty clay loam
Clay content: 35 to 60 percent
Reaction: pH 7.4 to 8.4
Note: The varves range from ⅛ inch to about 2 inches thick and limit the penetration of the soil by roots and water.

45—Grassvalley silty clay loam, 0 to 4 percent slopes

Composition

Grassvalley and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Lake plains
Slope: 0 to 4 percent
Elevation: 3,200 to 3,800 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 9.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a dark surface layer
- Moderately sodic soils
- Soils that are gravelly clay

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

46—Grassvalley silty clay loam, 4 to 8 percent slopes

Composition

Grassvalley and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Lake plains
Slope: 4 to 8 percent
Elevation: 3,200 to 3,800 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Dominant parent material: Glaciolacustrine deposits
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 9.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a dark surface layer
- Moderately sodic soils
- Soils that are gravelly clay

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

47—Grassvalley silty clay loam, 8 to 15 percent slopes

Composition

Grassvalley and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 8 to 15 percent
Elevation: 3,200 to 3,800 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 9.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Moderately sodic soils
- Soils that have a calcareous surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

48—Grassvalley silty clay loam, 15 to 30 percent slopes

Composition

Grassvalley and similar soils: 90 percent
Inclusions: 10 percent

Setting

Landform: Hills
Slope: 15 to 30 percent
Elevation: 3,200 to 3,800 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 9.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a calcareous surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section

- Wildlife habitat section
- Engineering and soil properties sections

Greenough Series

The Greenough series consists of very deep, well drained soils that formed in alluvium. These soils are on hills. Slope is 4 to 15 percent. Elevation is 3,200 to 4,500 feet. The average annual precipitation is 16 to 22 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Fine-silty, mixed Typic Eutroboralfs

Typical Pedon

Greenough silt loam, 4 to 15 percent slopes, in a forested area, 3,000 feet north and 1,300 feet west of the southeast corner of sec. 35, T. 13 N., R. 15 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 8 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak very fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine, medium, and coarse roots; many very fine pores; 10 percent pebbles; medium acid; clear wavy boundary.

E/Bt—8 to 22 inches; 80 percent light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (10YR 4/2) moist (E part); 20 percent light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist (B part); when mixed, texture is silt loam; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many very fine pores; 10 percent pebbles; slightly acid; clear wavy boundary.

Bt1—22 to 49 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common very fine pores; common thin clay films on faces of peds and in pores; 10 percent pebbles; neutral; gradual wavy boundary.

Bt2—49 to 60 inches; light brownish gray (2.5Y 6/2) gravelly silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few thin clay films on faces of peds and in pores; 30 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 4 and 12 inches
Other features: A BC horizon in some pedons

E horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 5 to 20 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles
Reaction: pH 5.6 to 6.5

E/Bt horizon
Hue: E part—10YR or 2.5Y; B part—10YR or 2.5Y
Value: E part—6 to 8 dry and 4 to 6 moist; B part—6 or 7 dry and 4 or 5 moist
Chroma: E part—2 to 4; B part—2 or 3
Clay content: 5 to 20 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.3

Bt horizon
Hue: 10YR or 2.5Y
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Silty clay loam or silt loam
Clay content: 18 to 32 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.3
Note: Below a depth of 49 inches, the content of rock fragments ranges from 0 to 35 percent.

49—Greenough silt loam, 4 to 15 percent slopes

Composition

Greenough and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 4 to 15 percent
Elevation: 3,200 to 4,500 feet
Mean annual precipitation: 16 to 22 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 11.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Crow and similar soils
- Lubrecht and similar soils
- Winkler, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Hagstadt Series

The Hagstadt series consists of moderately deep, well drained soils that formed in material derived from consolidated siltstone. These soils are on hills. Slope is 4 to 25 percent. Elevation is 3,500 to 4,000 feet. The average annual precipitation is 16 to 22 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Fine-silty, mixed, frigid Udic Ustochrepts

Typical Pedon

Hagstadt silt loam, 4 to 25 percent slopes, in a forested area, 1,000 feet west and 2,200 feet south of the northeast corner of sec. 21, T. 13 N., R. 15 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

A—0 to 5 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; moderate very thin and thin platy structure; soft, friable, nonsticky and slightly plastic; common fine and medium roots; common fine pores; 1 percent pebbles; neutral; gradual smooth boundary.

Bw—5 to 21 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/6) moist; moderate and strong fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common medium and few fine roots; common very fine and fine pores; 5 percent pebbles; 70 percent soft siltstone fragments; neutral; abrupt wavy boundary.

Cr—21 to 40 inches; very pale brown (10YR 7/4) consolidated siltstone, yellowish brown (10YR 5/6) moist; neutral.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between depths of 4 and 12 inches
Depth to consolidated siltstone: 20 to 40 inches
Content of clay in the control section: 28 to 35 percent
Base saturation: 60 to 100 percent

A horizon
Chroma: 2 or 3
Texture: Silt loam or silty clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.1 to 7.3
Note: When mixed to a depth of 7 inches, this horizon does not meet the requirements for a mollic epipedon.

Bw horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 to 6
Texture: Silty clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 5 percent hard pebbles and 60 to 75 percent soft siltstone fragments
Reaction: pH 6.1 to 7.3

50—Hagstadt silt loam, 4 to 25 percent slopes

Composition

Hagstadt and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 4 to 25 percent
Elevation: 3,500 to 4,000 feet
Mean annual precipitation: 16 to 22 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Siltstone residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Greenough and similar soils
- Lubrecht and similar soils
- Winkler, cool, soils
- Soils that are shallow over siltstone

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Half Moon Series

The Half Moon series consists of very deep, well drained soils that formed in glaciolacustrine deposits. These soils are on lake plains. Slope is 4 to 8 percent. Elevation is 3,200 to 4,500 feet. The average annual precipitation is 18 to 22 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Fine-silty, mixed Typic Eutroboralfs

Typical Pedon

Half Moon silt loam, 4 to 8 percent slopes, in a forested area, 2,300 feet south and 1,300 feet west of the northeast corner of sec. 26, T. 14 N., R. 16 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

E—0 to 7 inches; pinkish gray (7.5YR 7/2) silt loam, brown (7.5YR 5/2) moist; moderate medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; common medium pores; medium acid; clear wavy boundary.

Bt—7 to 18 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; strong fine and medium subangular blocky structure; hard, friable, very sticky and very plastic; many very fine, medium, and coarse roots; common fine pores; neutral; gradual smooth boundary.

Bk1—18 to 23 inches; pinkish gray (7.5YR 7/2) silty clay loam, pinkish gray (7.5YR 6/2) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, medium, and coarse roots; common coarse pores; few fine soft masses of lime; strongly effervescent; mildly alkaline; gradual smooth boundary.

Bk2—23 to 41 inches; pinkish white (7.5YR 8/2) silt loam, pinkish gray (7.5YR 6/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common fine pores; common fine soft masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.

C—41 to 60 inches; pinkish gray (7.5R 7/2) silt loam, pinkish gray (7.5YR 6/2) moist; varves ⅛ to ½ inch thick; hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 4 and 12 inches
Content of clay in the control section: 25 to 35 percent
Depth to Bk horizon: 14 to 35 inches
Other features: A thin discontinuous A horizon in some pedons

E horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 to 8 dry; 4 to 7 moist
Chroma: 1 to 3
Clay content: 15 to 25 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles, 0 to 5 percent pebbles
Reaction: pH 4.5 to 7.3

Bt horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 3 or 4
Texture: Silt loam or silty clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.8

Bk horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Silt loam or silty clay loam
Clay content: 25 to 30 percent
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 0 to 4 mmhos/cc
Reaction: pH 7.4 to 8.4

C horizon
Hue: 2.5Y, 10YR, or 7.5YR

Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Mainly very fine sandy loam, silt loam, or silty clay loam that has thin lenses of silty clay
Clay content: 20 to 30 percent
Electrical conductivity: 0 to 4 mmhos/cc
Reaction: pH 7.9 to 9.0

51—Half Moon silt loam, 4 to 8 percent slopes

Composition

Half Moon and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Lake plains
Slope: 4 to 8 percent
Elevation: 3,200 to 4,500 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Totelake and similar soils
- Poorly drained soils
- Winkler, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Hanaker Series

The Hanaker series consists of very deep, well drained soils that formed in glaciolacustrine deposits. These soils are on stream terraces. Slope is 0 to 6 percent. Elevation is 3,500 to 4,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Fine-silty, mixed Typic Argiborolls

Typical Pedon

Hanaker silt loam, 0 to 6 percent slopes, in an area of cropland, 2,400 feet north and 1,000 feet west of the southeast corner of sec. 24, T. 14 N., R. 15 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; common very fine and fine pores; neutral; clear smooth boundary.

A—8 to 15 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots and pores; mildly alkaline; clear wavy boundary.

Bt—15 to 25 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to weak fine blocky; slightly hard, friable, sticky and plastic; few very fine roots; common very fine pores; common moderately thick clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bk1—25 to 32 inches; white (10YR 8/2) silt loam, pale brown (10YR 6/3) moist; weak medium prismatic structure parting to weak fine blocky; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots and pores; common fine soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—32 to 42 inches; white (10YR 8/2), stratified silt loam and very fine sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine pores; common fine soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk3—42 to 60 inches; light gray (10YR 7/2), stratified gravelly sandy clay loam and gravelly sandy loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; 25 percent pebbles; common fine soft masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 4 and 12 inches
Mollic epipedon thickness: 13 to 16 inches
Depth to Bk horizon: 18 to 30 inches
Content of clay in the control section: 28 to 35 percent

A horizon
Value: 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Reaction: pH 6.6 to 7.8

Bt horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 27 to 35 percent
Reaction: pH 7.9 to 8.4

Bk1 horizon
Value: 7 or 8 dry; 6 or 7 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

Bk2 horizon
Value: 7 or 8 dry; 6 or 7 moist
Chroma: 2 or 3
Texture: Mainly silt loam that has thin lenses of very fine sandy loam
Clay content: 10 to 20 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

Bk3 horizon
Value: 6 to 8 dry; 5 or 6 moist
Texture: Mainly sandy clay loam that has thin lenses of sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles, 15 to 30 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

52—Hanaker silt loam, 0 to 6 percent slopes

Composition

Hanaker and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 6 percent
Elevation: 3,500 to 4,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 10.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Perma and similar soils
- Tally variant soils
- Soils that have a light-colored surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Haploxerolls

Haploxerolls consist of very deep, well drained to excessively drained soils that formed in alluvium. These soils are on alluvial fans, stream terraces, and hills. Slope is 0 to 60 percent. Elevation is 3,300 to 4,500 feet. The average annual precipitation is 13 to 16 inches, the average annual air temperature is 42 to 44 degrees F, and the frost-free season is 90 to 110 days.

Typical Pedon

Haploxerolls in an area of rangeland, 1,100 feet west and 2,500 feet south of the northeast corner of sec. 8, T. 14 N., R. 20 W.

0 to 13 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; 25 percent pebbles; neutral; gradual wavy boundary.

13 to 19 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and

nonplastic; many fine and very fine roots; 50 percent pebbles; neutral; clear wavy boundary.

19 to 34 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; 55 percent pebbles; slightly effervescent; moderately alkaline; gradual wavy boundary.

34 to 60 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; 65 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Surface texture: Gravelly loam, very gravelly loam, gravelly silt loam, or very gravelly silt loam

Subsurface texture: Extremely gravelly loamy sand to very gravelly loam

Hollandlake Series

The Hollandlake series consists of very deep, well drained soils that formed in alpine till. These soils are on moraines. Slope is 4 to 60 percent. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Typic Cryoboralfs

Typical Pedon

Hollandlake gravelly loam, 4 to 30 percent slopes, in a forested area, 860 feet north and 990 feet east of the west quarter corner of sec. 12, T. 19 N., R. 16 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 4 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; 20 percent pebbles; medium acid; clear wavy boundary.

E/B—4 to 12 inches; 75 percent light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist (E part); 25 percent yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist (B part); weak medium subangular blocky structure; hard, friable, nonsticky and nonplastic; many fine and medium roots; 25 percent pebbles; medium acid; clear wavy boundary.

Bt/E—12 to 22 inches; 75 percent yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist (Bt part); 25 percent light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist (E part); weak medium subangular blocky structure; very hard, friable, nonsticky and slightly plastic; common fine roots; few thin clay films on faces of peds; 35 percent pebbles, 5 percent cobbles; medium acid; gradual wavy boundary.

Bt—22 to 60 inches; light brown (7.5YR 6/4) very gravelly clay loam, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common moderately thick clay films on faces of peds; 35 percent pebbles, 10 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 39 to 44 degrees F

Moisture control section: Between depths of 4 and 12 inches

Depth to argillic horizon: 8 to 16 inches

E horizon

Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 15 to 35 percent pebbles
Reaction: pH 5.1 to 6.0

E/B horizon

Hue: E part—7.5YR or 10YR; B part—7.5YR or 10YR
Value: E part—6 or 7 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—3 or 4
Texture: Loam or silt loam
Clay content: 15 to 27 percent
Content of rock fragments: 15 to 35 percent pebbles
Reaction: pH 5.1 to 6.0

Bt/E horizon

Hue: B part—7.5YR or 10YR; E part—7.5YR or 10YR
Value: B part—5 or 6 dry and 4 or 5 moist; E part—6 or 7 dry and 5 or 6 moist
Chroma: B part—3 or 4; E part—2 or 3
Texture: Loam or clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 35 to 55 percent—0 to 10 percent cobbles, 35 to 45 percent pebbles
Reaction: pH 5.1 to 6.0

Bt horizon

Hue: 7.5YR or 10YR

Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 to 6
Texture: Clay loam or sandy clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 35 to 55 percent—0 to 10 percent cobbles, 35 to 45 percent pebbles
Reaction: pH 6.6 to 7.3

53—Hollandlake gravelly loam, 4 to 30 percent slopes

Composition

Hollandlake and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent
Elevation: 4,000 to 4,500 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bata and similar soils
- Poorly drained soils
- Rumblecreek and similar soils
- Upsata soils on terraces

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

54—Hollandlake-Bata complex, 4 to 30 percent slopes

Composition

Hollandlake and similar soils: 45 percent
Bata and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Hollandlake—Moraines
- Bata—Moraines

Slope:
- Hollandlake—4 to 30 percent
- Bata—4 to 30 percent

Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Hollandlake
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.3 inches

Bata
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Rumblecreek and similar soils
- Poorly drained soils
- Waldbillig and similar soils
- Upsata soils on terraces

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section

- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

55—Hollandlake-Bata complex, 30 to 60 percent slopes

Composition

Hollandlake and similar soils: 45 percent
Bata and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Hollandlake—Moraines
- Bata—Moraines

Slope:
- Hollandlake—30 to 60 percent
- Bata—30 to 60 percent

Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Hollandlake
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.3 inches

Bata
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Rumblecreek and similar soils
- Waldbillig and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:
- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Holloway Series

The Holloway series consists of very deep, somewhat excessively drained soils that formed in colluvium derived from argillite and quartzite. The surface layer of these soils has a high content of volcanic ash. The soils are on mountains and moraines. Slope is 8 to 80 percent. Elevation is 4,200 to 7,000 feet. The average annual precipitation is 30 to 60 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Andic Cryochrepts

Typical Pedon

Holloway gravelly silt loam, 30 to 60 percent slopes, in a forested area, 1,200 feet south and 800 feet east of the northwest corner of sec. 7, T. 11 N., R. 22 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

A—0 to 10 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 25 percent pebbles, 5 percent cobbles; strongly acid; clear wavy boundary.

2E—10 to 17 inches; light gray (10YR 7/2) extremely gravelly fine sandy loam, light brownish gray (10YR 6/2) moist; weak fine granular structure; very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; common very fine and fine pores; 55 percent pebbles, 10 percent cobbles; medium acid; gradual smooth boundary.

2E and Bt—17 to 52 inches; about 75 percent light gray (10YR 7/2) extremely gravelly sandy loam, pale brown (10YR 6/3) moist (E part); about 25 percent pale brown (10YR 6/3) fine sandy loam lamellae ⅛ to ½ inch thick, brown (10YR 5/3) moist (Bt part); when mixed, texture is extremely gravelly sandy loam; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and few medium roots; common fine

and very fine pores; 55 percent pebbles, 10 percent cobbles; medium acid; gradual smooth boundary.

2C—52 to 60 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots and pores; 55 percent pebbles, 15 percent cobbles; slightly acid.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between depths of 8 and 24 inches
Control section: 5 to 15 percent clay; less than 35 percent silt; 60 percent or more total sand; more than 35 percent fine sand and coarser textures
Other features: A thin discontinuous E horizon in some pedons

A horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 to 6
Clay content: 5 to 15 percent
Content of rock fragments: 10 to 35 percent—0 to 10 percent angular cobbles or flagstones and stones, 10 to 30 percent angular pebbles or channers
Bulk density: 1.0 g/cc or less
Content of glass: 5 to 10 percent
Aluminum plus ½ iron percentages (by ammonium oxalate): 1 to 2 percent
Reaction: pH 5.1 to 6.5

2E horizon
Hue: 10YR or 7.5YR
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, or fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 45 to 75 percent—0 to 15 percent angular cobbles or flagstones and stones, 45 to 60 percent angular pebbles or channers
Reaction: pH 5.1 to 6.5

2E and Bt horizon
Hue: E part—10YR or 7.5YR; B part—10YR or 7.5YR
Value: E part—6 or 7 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—2 to 4
Texture: Sandy loam or fine sandy loam
Clay content: 5 to 15 percent; less than 3 percent clay increase in lamellae
Content of rock fragments: 60 to 80 percent—5 to 15 percent angular cobbles or flagstones and stones, 55 to 70 percent angular pebbles or channers
Reaction: pH 5.1 to 6.5

2C horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, or loamy sand
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 85 percent—5 to 20 percent angular cobbles or flagstones and stones, 55 to 70 percent angular pebbles or channers
Reaction: pH 5.1 to 6.5

56—Holloway gravelly silt loam, 8 to 30 percent slopes

Composition

Holloway and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,500 to 5,500 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Mitten and similar soils
- Tevis and similar soils
- Waldbillig and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

57—Holloway gravelly silt loam, 30 to 60 percent slopes

Composition

Holloway and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Mitten and similar soils
- Tevis and similar soils
- Waldbillig and similar soils
- Soils that are shallow over bedrock
- Areas of rock outcrop
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

58—Holloway gravelly silt loam, cool, 8 to 30 percent slopes

Composition

Holloway and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 40 to 60 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Felan, cool, soils
- Soils that support Douglas-fir and larch
- Coerock and similar soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

59—Holloway gravelly silt loam, cool, 30 to 60 percent slopes

Composition

Holloway and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains

Slope: 30 to 60 percent
Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 40 to 60 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Felan, cool, soils
- Soils that support Douglas-fir and larch
- Phillcher and similar soils
- Coerock and similar soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

60—Holloway-Rock outcrop complex, 50 to 80 percent slopes

Composition

Holloway and similar soils: 50 percent
Rock outcrop: 30 percent
Inclusions: 20 percent

Setting

Landform:
- Holloway—Mountains
- Rock outcrop—Mountains

Slope:
- Holloway—50 to 80 percent
- Rock outcrop—50 to 80 percent

Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.4 inches

Rock outcrop
Definition: Exposures of argillite or quartzite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway, cool, soils
- Mitten and similar soils
- Tevis and similar soils
- Soils that are shallow over bedrock
- Areas of rubble land
- Soils that have slopes of less than 50 percent

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Jimlake Series

The Jimlake series consists of very deep, well drained soils that formed in alpine till derived mainly from limestone. The surface layer of these soils has a high content of volcanic ash. The soils are on moraines. Slope is 4 to 60 percent. Elevation is 3,800 to 6,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Andeptic Cryoboralfs

Typical Pedon

Jimlake gravelly silt loam, 4 to 30 percent slopes, in a forested area, 1,100 feet west and 900 feet north of the center of sec. 8, T. 20 N., R. 17 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 1 inch; light gray (10YR 7/2) gravelly silt loam, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 20 percent pebbles; medium acid; clear wavy boundary.

Bs—1 to 7 inches; brown (7.5YR 5/4) gravelly silt loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 20 percent pebbles; medium acid; clear wavy boundary.

2Bt/E—7 to 14 inches; 65 percent light yellowish brown gravelly silt loam, yellowish brown (10YR 5/6) moist (Bt part); 35 percent very pale brown (10YR 7/3) gravelly silt loam, pale brown (10YR 6/3) moist (E part); when mixed, texture is gravelly silt loam; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and medium roots; many fine pores; 25 percent pebbles; slightly acid; clear wavy boundary.

2Bt1—14 to 24 inches; light yellowish brown (10YR 6/4) very gravelly silt loam, yellowish brown (10YR 5/6) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine pores; common moderately thick clay films on faces of peds; 35 percent pebbles; slightly acid; clear wavy boundary.

2Bt2—24 to 38 inches; light yellowish brown (10YR 6/4) very gravelly silt loam, yellowish brown (10YR 5/6) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine pores; common thin clay films on faces of peds; 40 percent pebbles; neutral; gradual wavy boundary.

2BC—38 to 60 inches; light yellowish brown (2.5Y 6/4) very gravelly silt loam, light olive brown (2.5Y 5/4) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; 35 percent pebbles, 10 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 39 to 44 degrees F

Moisture control section: Between depths of 4 and 12 inches

Content of clay in the control section: 10 to 20 percent

Content of rock fragments: 35 to 60 percent in the control section

Depth to carbonates: Mainly below a depth of 60 inches but ranges to 40 inches

E horizon

Hue: 10YR to 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 7 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles and stones, 15 to 30 percent pebbles
Reaction: pH 5.6 to 6.5
Moist bulk density: 0.95 g/cc or less

Bs horizon

Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6
Clay content: 7 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles and stones, 15 to 30 percent pebbles
Moist bulk density: 0.95 g/cc or less
Reaction: pH 5.6 to 6.5
Note: Some pedons have a thin E/B horizon.

2Bt/E horizon

Hue: B part—2.5Y or 10YR; E part—2.5Y or 10YR
Value: B part—5 or 6 dry and 4 or 5 moist; E part—6 or 7 dry and 5 or 6 moist
Chroma: B part—3 to 6; E part—2 to 4
Texture: Silt loam or loam
Clay content: 10 to 18 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles and stones, 15 to 30 percent pebbles
Reaction: pH 6.1 to 7.3

2Bt horizon

Hue: 2.5Y or 10YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6
Texture: Silt loam or loam
Clay content: 13 to 20 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles and stones, 35 to 50 percent pebbles
Reaction: pH 6.1 to 7.3

2BC horizon

Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 5 or 6 moist

Chroma: 3 or 4
Texture: Silt loam or loam
Clay content: 10 to 18 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles and stones, 35 to 50 percent pebbles
Reaction: pH 6.6 to 7.8
Note: Some pedons do not have a 2BC horizon.

61—Jimlake gravelly silt loam, 4 to 30 percent slopes

Composition

Jimlake and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent
Elevation: 3,800 to 4,500 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Waldbillig and similar soils
- Poorly drained, ponded soils
- Soils that have a lower content of clay
- Upsata soils on terraces
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

62—Jimlake gravelly silt loam, 30 to 60 percent slopes

Composition

Jimlake and similar soils: 90 percent
Inclusions: 10 percent

Setting

Landform: Moraines
Slope: 30 to 60 percent
Elevation: 4,400 to 6,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Felan and similar soils
- Soils that have a lower content of clay

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Lantern Series

The Lantern series consists of very deep, somewhat excessively drained soils that formed in material derived from micaceous schist. These soils are on mountain slopes. Slope is 8 to 80 percent. Elevation is 4,000 to 5,500 feet. The average annual precipitation is 25 to 40

inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Dystric Eutrochrepts

Typical Pedon

Lantern gravelly sandy loam, 30 to 60 percent slopes, in a forested area, 1,750 feet east and 1,400 feet north of the southwest corner of sec. 2, T. 11 N., R. 22 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 14 inches; light gray (10YR 7/2) gravelly sandy loam, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; few very fine pores; 25 percent pebbles; slightly acid; gradual wavy boundary.

E2—14 to 26 inches; light gray (10YR 7/2) very gravelly sandy loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; few very fine pores; 30 percent pebbles, 10 percent cobbles; slightly acid; gradual wavy boundary.

E and Bt—26 to 39 inches; pale brown (10YR 6/3) very gravelly sandy loam, yellowish brown (10YR 5/4) moist (E part); lamellae of brown (10YR 5/3) very gravelly fine sandy loam, brown (10YR 4/3) moist (B part); weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine pores; 45 percent pebbles, 10 percent cobbles; neutral; gradual wavy boundary.

BC—39 to 60 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine pores; 45 percent pebbles, 20 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 8 and 24 inches
Control section: 5 to 17 percent clay and 15 to 40 percent mica, by weight

E1 horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent pebbles
Reaction: pH 6.1 to 6.5

E2 horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 60 percent—0 to 10 percent cobbles, 15 to 50 percent pebbles
Reaction: pH 6.1 to 6.5

E and Bt horizon
Hue: E part—10YR or 2.5Y; B part—10YR or 2.5Y
Value: E part—6 or 7 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—3 or 4; B part—3 or 4
Texture: Sandy loam or fine sandy loam
Clay content: 5 to 18 percent; less than 3 percent clay increase in lamellae
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles, 35 to 45 percent pebbles
Reaction: pH 6.1 to 7.3

BC horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 or 4
Texture: Sandy loam or loamy sand
Clay content: 5 to 15 percent
Content of rock fragments: 45 to 80 percent—0 to 20 percent cobbles, 45 to 60 percent pebbles
Reaction: pH 6.1 to 7.3

63—Lantern gravelly sandy loam, 8 to 30 percent slopes

Composition

Lantern and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,000 to 5,500 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chickaman and similar soils
- Lantern soils on drier aspects
- Soils that have a subsoil of sandy clay loam

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

64—Lantern gravelly sandy loam, 30 to 60 percent slopes

Composition

Lantern and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,000 to 5,500 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chickaman and similar soils
- Lantern soils on drier aspects

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

65—Lantern-Rock outcrop complex, 50 to 80 percent slopes

Composition

Lantern and similar soils: 55 percent
Rock outcrop: 25 percent
Inclusions: 20 percent

Setting

Landform:
- Lantern—Mountains
- Rock outcrop—Mountains

Slope:
- Lantern—50 to 80 percent, southwest aspect
- Rock outcrop—50 to 80 percent

Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Lantern
Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.9 inches

Rock outcrop
Definition: Exposures of micaceous schist

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that are shallow over bedrock
- Areas of rubble land

Management

For general and detailed information concerning

managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Lolopeak Series

The Lolopeak series consists of very deep, excessively drained soils that formed in colluvium derived from granite and gneiss. The surface layer of these soils has a high content of volcanic ash. The soils are on mountain slopes. Slope is 50 to 80 percent. Elevation is 6,500 to 8,500 feet. The average annual precipitation is 45 to 80 inches, the average annual air temperature is 33 to 36 degrees F, and the frost-free season is 30 to 40 days.

Taxonomic Class: Sandy-skeletal, mixed Andic Cryumbrepts

Typical Pedon

Lolopeak bouldery loam, 50 to 80 percent slopes, in a forested area, 200 feet north and 800 feet west of the east quarter corner of sec. 34, T. 11 N., R. 22 W.

Oi—3 inches to 0; undecomposed and slightly decomposed forest litter.

A—0 to 9 inches; brown (10YR 4/3) bouldery loam, very dark brown (10YR 2/2) moist; weak medium and coarse granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 1 percent boulders and 10 percent pebbles; strongly acid; clear wavy boundary.

2Bw—9 to 27 inches; yellowish brown (10YR 5/4) extremely stony loamy coarse sand, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and common coarse roots; 10 percent stones, 10 percent cobbles, 45 percent pebbles; medium acid; gradual wavy boundary.

2C—27 to 60 inches; pale brown (10YR 6/3) extremely stony loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; 15 percent stones, 10 percent cobbles, 50 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 35 to 38 degrees F

Moisture control section: Between depths of 12 and 35 inches

Content of clay in the control section: 0 to 5 percent

A horizon
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 2 or 3
- Clay content: 7 to 12 percent
- Content of rock fragments: 15 to 35 percent—5 to 10 percent cobbles, stones, and boulders and 10 to 25 percent pebbles
- Bulk density: 0.95 g/cc or less
- Base saturation: 20 to 50 percent
- Reaction: pH 5.1 to 6.0

2Bw horizon
- Value: 5 or 6 dry; 4 or 5 moist
- Chroma: 3 or 4
- Clay content: 0 to 5 percent
- Content of rock fragments: 60 to 85 percent—15 to 35 percent cobbles and stones, 45 to 50 percent pebbles
- Reaction: pH 5.1 to 6.0

2C horizon
- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 3 or 4
- Clay content: 0 to 5 percent
- Content of rock fragments: 60 to 85 percent—15 to 35 percent cobbles and stones, 45 to 50 percent pebbles
- Reaction: pH 5.1 to 6.0

66—Lolopeak bouldery loam, 50 to 80 percent slopes

Composition

Lolopeak and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 50 to 80 percent
Elevation: 6,500 to 8,500 feet
Mean annual precipitation: 45 to 80 inches
Frost-free period: 30 to 40 days

Component Description

Surface layer texture: Bouldery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Petty, cool, soils
- Soils that do not contain volcanic ash
- Soils derived from micaceous schist
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

67—Lolopeak-Rock outcrop complex, 50 to 80 percent slopes

Composition

Lolopeak and similar soils: 50 percent
Rock outcrop: 20 percent
Inclusions: 30 percent

Setting

Landform:
- Lolopeak—Mountains
- Rock outcrop—Mountains

Slope:
- Lolopeak—50 to 80 percent
- Rock outcrop—50 to 80 percent

Elevation: 6,500 to 8,500 feet
Mean annual precipitation: 45 to 80 inches
Frost-free period: 30 to 40 days

Component Description

Lolopeak
Surface layer texture: Bouldery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.0 inches

Rock outcrop
Definition: Exposures of granite or gneiss bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Petty, cool, soils
- Soils derived from micaceous schist
- Soils that are 10 to 40 inches deep over bedrock
- Soils that do not contain volcanic ash

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Lubrecht Series

The Lubrecht series consists of moderately deep, well drained soils that formed in material derived mainly from consolidated siltstone. These soils are on hills. Slope is 4 to 15 percent. Elevation is 3,500 to 4,500 feet. The average annual precipitation is 16 to 22 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Fine, mixed Typic Eutroboralfs

Typical Pedon

Lubrecht silt loam, 4 to 15 percent slopes, in a forested area, 2,300 feet west of the southeast corner of sec. 20, T. 13 N., R. 15 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 4 inches; light grayish brown (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak very thin platy structure parting to moderate very fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine pores; 5 percent pebbles; strongly acid; abrupt smooth boundary.

E/Bt—4 to 8 inches; 75 percent light grayish brown (10YR 6/2) silt loam, brown (10YR 4/3) moist (E part); 25 percent very pale brown (10YR 7/3) silt loam, brown (10YR 4/3) moist (Bt part); moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine pores; common moderately thick clay films on faces of peds; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt/E—8 to 11 inches; 80 percent very pale brown

(10YR 7/4) silty clay loam, dark yellowish brown (10YR 4/4) moist (Bt part); 20 percent brown (10YR 5/3) silty clay loam, dark yellowish brown (10YR 4/4) moist (E part); strong fine subangular blocky structure; very hard, firm, sticky and plastic; many very fine, fine, medium, and coarse roots; many fine pores; common moderately thick clay films on faces of peds; medium acid; abrupt wavy boundary.

Bt1—11 to 19 inches; very pale brown (10YR 7/3) silty clay, dark yellowish brown (10YR 4/4) moist; strong medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; common very fine, fine, medium, and coarse roots; common very fine pores; common moderately thick clay films on faces of peds; common very dark grayish brown (10YR 3/2) organic stains; medium acid; clear smooth boundary.

Bt2—19 to 30 inches; very pale brown (10YR 7/3) silty clay, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine and few medium and coarse roots; common very fine pores; many moderately thick clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—30 to 36 inches; very pale brown (10YR 7/3) gravelly silty clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine roots; common very fine pores; few thin clay films on faces of peds; 20 percent pebbles; medium acid; clear smooth boundary.

Cr—36 to 60 inches; consolidated siltstone.

Range in Characteristics

Soil temperature: 39 to 44 degrees F

Moisture control section: Between depths of 4 and 12 inches

Depth to consolidated siltstone: 30 to 40 inches

E horizon

Value: 5 or 6 dry; 4 or 5 moist
Clay content: 10 to 27 percent
Texture: Loam or silt loam
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 5.1 to 7.3

E/Bt horizon

Value: E part—6 or 7 dry and 4 to 6 moist; B part—5 or 6 dry and 3 or 4 moist
Chroma: E part—2 or 3; B part—2 to 4
Clay content, mixed: 10 to 27 percent
Texture: Loam or silt loam
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 7.3

Bt/E horizon

Value: B part—5 or 6 dry and 4 or 5 moist; E part—6 or 7 dry and 4 to 6 moist
Chroma: B part—2 to 4; E part—2 to 4
Texture: Silty clay loam or clay loam
Clay content, mixed: 27 to 40 percent
Reaction: pH 5.6 to 7.3

Bt1 and Bt2 horizons

Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Silty clay or clay
Clay content: 40 to 60 percent
Reaction: pH 5.1 to 7.3

Bt3 horizon

Value: 5 or 6 dry; 4 to 6 moist
Chroma: 2 to 4
Clay content: 27 to 40 percent
Texture: Silty clay or clay
Content of rock fragments: 15 to 35 percent—0 to 5 percent angular cobbles, 15 to 30 percent angular pebbles
Reaction: pH 5.1 to 7.3

68—Lubrecht silt loam, 4 to 15 percent slopes

Composition

Lubrecht and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 4 to 15 percent
Elevation: 3,500 to 4,500 feet
Mean annual precipitation: 16 to 22 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Siltstone residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Crow and similar soils

- Greenough and similar soils
- Hagstadt and similar soils
- Winkler, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Mitten Series

The Mitten series consists of very deep, somewhat excessively drained soils that formed in colluvium derived from argillite and quartzite bedrock. The surface layer of these soils has a high content of volcanic ash. The soils are on mountain slopes. Slope is 8 to 70 percent. Elevation is 4,200 to 6,000 feet. The average annual precipitation is 25 to 40 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Andic Dystric Eutrochrepts

Typical Pedon

Mitten gravelly silt loam, 30 to 60 percent slopes, in a forested area, 1,500 feet east of the northwest corner of sec. 13, T. 12 N., R. 19 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

Bs—0 to 9 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 15 percent pebbles; slightly acid; abrupt wavy boundary.

2E—9 to 16 inches; pinkish gray (7.5YR 7/2) very gravelly sandy loam, brown (7.5YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 45 percent pebbles, 5 percent cobbles; slightly acid; clear wavy boundary.

2E and Bw—16 to 34 inches; 80 percent pinkish gray sandy (7.5YR 7/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist (E part); 20 percent brown (7.5YR 5/4) extremely gravelly sandy loam lamellae, brown (7.5YR 4/4) moist (B part); when mixed, texture is extremely gravelly sandy loam; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 50 percent angular pebbles, 15 percent angular cobbles; slightly acid; diffuse irregular boundary.

2BC—34 to 60 inches; pinkish gray (7.5YR 5/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 50 percent pebbles, 15 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 41 to 46 degrees F
Moisture control section: Between depths of 8 and 24 inches
Content of clay in the control section: 5 to 10 percent

Bs horizon
Value: 4 or 5 moist
Chroma: 3 or 4
Clay content: 5 to 10 percent
Content of rock fragments: 15 to 50 percent—0 to 30 percent angular cobbles, 10 to 45 percent angular pebbles
Reaction: pH 5.6 to 6.5
Moist bulk density: 1.0 g/cc or less

2E horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Very fine sandy loam, fine sandy loam, sandy loam, or loam
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 80 percent—5 to 10 percent angular cobbles, 30 to 70 percent angular pebbles
Reaction: pH 5.6 to 6.5

2E and Bw horizon
Hue: E part—7.5YR or 10YR; B part—2.5Y, 7.5YR, or 10YR
Value: E part—6 or 7 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—3 or 4
Texture: Very fine sandy loam, fine sandy loam, sandy loam, or loam
Clay content, mixed: 5 to 10 percent
Content of rock fragments: 60 to 80 percent—10 to 20 percent angular cobbles, 50 to 60 percent angular pebbles
Reaction: pH 5.6 to 6.5
Note: Some pedons have a 2Bw/E horizon below the 2E/Bw horizon.

2BC horizon
Hue: 10YR or 7.5YR

Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Fine sandy loam, sandy loam, coarse sandy loam, or loam
Clay content: 5 to 10 percent
Content of rock fragments: 60 to 85 percent—10 to 20 percent angular cobbles, 50 to 65 percent angular pebbles
Reaction: pH 5.6 to 7.3

69—Mitten gravelly silt loam, 30 to 60 percent slopes

Composition

Mitten and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway and similar soils
- Tevis and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

70—Mitten-Sharrott, cool, complex, 15 to 40 percent slopes

Composition

Mitten and similar soils: 50 percent
Sharrott and similar soils: 30 percent
Inclusions: 20 percent

Setting

Landform:
- Mitten—Mountains
- Sharrott—Mountains

Slope:
- Mitten—15 to 40 percent
- Sharrott—15 to 40 percent

Elevation: 4,200 to 5,200 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 75 to 90 days

Component Description

Mitten

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

Sharrott

Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 1.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway and similar soils
- Tevis and similar soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

71—Mitten-Tevis complex, 30 to 60 percent slopes

Composition

Mitten and similar soils: 45 percent
Tevis and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Mitten—Mountains
- Tevis—Mountains

Slope:
- Mitten—30 to 60 percent
- Tevis—30 to 60 percent

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

Tevis
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Beeskove and similar soils
- Holloway and similar soils
- Winkler, cool, soils
- Soils that have slopes of more than 60 percent

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Moiese Series

The Moiese series consists of very deep, excessively drained soils that formed in alluvium. These soils are on alluvial fans and stream terraces. Slope is 0 to 2 percent. Elevation is 2,800 to 3,500 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 43 to 45 degrees F, and the frost-free season is 105 to 120 days.

Taxonomic Class: Sandy-skeletal, mixed, frigid Calciorthidic Haploxerolls

Typical Pedon

Moiese gravelly loam, 0 to 2 percent slopes, in an area of cropland, 2,640 feet west and 1,320 feet south of the northeast quarter corner of sec. 30, T. 13 N., R. 19 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine pores; 25 percent pebbles; neutral; clear wavy boundary.

Bw—9 to 21 inches; brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; many fine pores; 40 percent pebbles, 10 percent cobbles; neutral; clear wavy boundary.

2Bk1—21 to 31 inches; light brownish gray (10YR 6/2) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 45 percent pebbles, 20 percent cobbles; slightly effervescent; moderately alkaline; gradual smooth boundary.

2Bk2—31 to 60 inches; pale brown (10YR 6/3) extremely gravelly sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 55 percent pebbles, 20 percent cobbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F
Moisture control section: Between depths of 12 and 35 inches
Mollic epipedon thickness: 7 to 16 inches
Content of clay in the control section: 5 to 15 percent

Ap horizon
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 22 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles, 0 to 30 percent pebbles
Reaction: pH 6.1 to 7.3

Bw horizon
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles, 35 to 45 percent pebbles
Reaction: pH 6.6 to 7.8

2Bk1 horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy sand, loamy coarse sand, sand, or fine sand
Clay content: 0 to 5 percent
Content of rock fragments: 45 to 75 percent—0 to 20 percent cobbles, 45 to 55 percent pebbles
Calcium carbonate equivalent: 8 to 15 percent
Reaction: pH 7.4 to 8.4

2Bk2 horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy coarse sand, coarse sand, or loamy sand
Clay content: 0 to 5 percent
Content of rock fragments: 50 to 85 percent—0 to 20 percent cobbles, 50 to 65 percent pebbles
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

72—Moiese gravelly loam, 0 to 2 percent slopes

Composition

Moiese and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Elevation: 2,800 to 3,500 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 120 days
Note: In areas outside the Missoula Valley, this soil has a shorter frost-free period.

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Alberton and similar soils
- Bigarm and similar soils
- Grantsdale and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Orthents

Orthents consist of very deep, well drained to excessively drained soils that formed in a variety of disturbed and reworked soil material. These soils are on stream terraces. Slope is 0 to 4 percent. Elevation is 2,800 to 3,500 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 43 to 45 degrees F, and the frost-free season is 105 to 120 days.

Typical Pedon

Orthents on a golf course, 2,500 feet east and 1,000 feet north of the southwest corner of sec. 31, T. 13 N., R. 19 W.

0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, nonsticky and nonplastic; 5 percent pebbles; neutral; clear smooth boundary.

4 to 20 inches; light brownish gray (10YR 6/2) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) moist; massive; loose, nonsticky and nonplastic; 45 percent pebbles, 20 percent cobbles; neutral; gradual wavy boundary.
20 to 60 inches; pale brown (10YR 6/3) extremely gravelly sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; 55 percent pebbles, 20 percent cobbles; neutral.

Range in Characteristics

Texture: Silty clay loam to extremely gravelly sand

73—Orthents, 0 to 4 percent slopes

Composition

Orthents and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 4 percent
Elevation: 2,800 to 3,500 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 105 to 120 days

Component Description

Depth class: Very deep (more than 60 inches)
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Areas of urban land
- Grantsdale and similar soils
- Moiese and similar soils
- Bigarm and similar soils
- Grassvalley and similar soils
- Argixerolls and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Ovando Series

The Ovando series consists of very deep, excessively drained soils that formed in igneous colluvium. These soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 4,500 to 6,200 feet. The average annual precipitation is 20 to 30 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Sandy-skeletal, mixed Typic Cryorthents

Typical Pedon

Ovando gravelly sandy loam, in an area of Ovando-Elkner-Rock outcrop complex, 30 to 60 percent slopes; in a forested area, 2,700 feet north and 1,000 feet east of the southwest corner of sec. 28, T. 13 N., R. 14 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
E1—0 to 6 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; common very fine and fine pores; 20 percent pebbles; slightly acid; clear wavy boundary.
E2—6 to 25 inches; light gray (10YR 7/2) very gravelly loamy coarse sand, grayish brown (10YR 5/2) moist; weak fine granular structure; loose, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; common very fine and fine pores; 40 percent pebbles; medium acid; clear wavy boundary.
E and Bt—25 to 49 inches; 80 percent very pale brown (10YR 7/4) very gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist (E part); 20 percent brown (10YR 5/3) lamellae of sandy loam ⅛ to ½ inch thick, dark yellowish brown (10YR 4/4) moist (Bt part); when mixed, texture is very gravelly loamy coarse sand; single grain; loose, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 5 percent cobbles, 45 percent pebbles; medium acid; gradual smooth boundary.
C—49 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; 20 percent cobbles, 55 percent pebbles; medium acid.

Range in Characteristics

Soil temperature: 37 to 44 degrees F
Moisture control section: Between depths of 12 and 35 inches; not dry in any part for as long as 90 consecutive days

E1 horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 15 to 80 percent—0 to 40 percent stones, boulders, or cobbles and 5 to 45 percent pebbles
Reaction: pH 5.6 to 6.5

E2 horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Clay content: 0 to 10 percent
Texture: Sandy loam or loamy coarse sand
Content of rock fragments: 15 to 80 percent—0 to 40 percent stones, boulders, or cobbles and 5 to 45 percent pebbles
Reaction: pH 5.6 to 6.5

E and Bt horizon
Hue: E part—10YR or 2.5Y; B part—10YR or 2.5Y
Value: E part—6 or 7 dry and 4 or 5 moist; B part—4 or 5 dry and moist
Chroma: E part—2 to 4; B part—3 or 4
Clay content: 0 to 5 percent; less than 3 percent clay increase in lamellae
Content of rock fragments: 35 to 60 percent—0 to 40 percent cobbles and stones, 10 to 50 percent pebbles
Reaction: pH 5.6 to 7.3

C horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 0 to 5 percent
Content of rock fragments: 60 to 80 percent—5 to 40 percent cobbles and stones, 20 to 60 percent pebbles
Reaction: pH 5.6 to 7.3

74—Ovando-Elkner-Rock outcrop complex, 30 to 60 percent slopes

Composition

Ovando and similar soils: 40 percent
Elkner and similar soils: 30 percent
Rock outcrop: 15 percent
Inclusions: 15 percent

Setting

Landform:
- Ovando—Mountains
- Elkner—Mountains
- Rock outcrop—Mountains

Slope:
- Ovando—30 to 60 percent
- Elkner—30 to 60 percent
- Rock outcrop—30 to 60 percent

Elevation: 4,500 to 6,200 feet
Mean annual precipitation: 20 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Ovando
Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.1 inches

Elkner
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.7 inches

Rock outcrop
Definition: Exposures of granite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that are shallow over bedrock
- Soils that have volcanic ash in the surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Perma Series

The Perma series consists of very deep, somewhat excessively drained soils that formed in alluvium. These soils are on stream terraces and hills. Slope is 0 to 45

percent. Elevation is 3,500 to 4,700 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed Typic Haploborolls

Typical Pedon

Perma gravelly loam, 0 to 4 percent slopes, in an area of rangeland, 1,500 feet east and 300 feet north of the southwest corner of sec. 19, T. 14 N., R. 15 W.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine pores; 20 percent pebbles; neutral; clear wavy boundary.

A2—6 to 12 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine pores; 30 percent pebbles; neutral; clear wavy boundary.

Bw1—12 to 22 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine pores; 35 percent pebbles, 15 percent cobbles; neutral; gradual wavy boundary.

Bw2—22 to 36 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine pores; 40 percent pebbles, 15 percent cobbles; mildly alkaline; gradual wavy boundary.

BC—36 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 50 percent pebbles, 20 percent cobbles; mildly alkaline.

Range in Characteristics

A horizon

Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 7 to 20 percent
Content of rock fragments: 15 to 60 percent—0 to 30 percent cobbles, stones, and boulders and 10 to 50 percent pebbles
Reaction: pH 6.6 to 7.3

Bw horizon

Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 7 to 27 percent
Content of rock fragments: 35 to 85 percent—0 to 50 percent cobbles and stones, 25 to 65 percent pebbles
Reaction: pH 6.6 to 7.8

BC horizon

Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, loamy sand, or sandy loam
Clay content: 0 to 15 percent
Content of rock fragments: 60 to 85 percent—10 to 50 percent cobbles and stones, 50 to 65 percent pebbles
Reaction: pH 6.6 to 7.8

75—Perma gravelly loam, 0 to 4 percent slopes

Composition

Perma and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 4 percent
Elevation: 3,500 to 4,500 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Perma variant soils

- Perma stony loam
- Soils that have a substratum of sand and gravel

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

76—Perma gravelly loam, 20 to 45 percent slopes

Composition

Perma and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 20 to 45 percent
Elevation: 3,500 to 4,500 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Perma variant soils
- Perma stony loam
- Soils that have a substratum of sand and gravel

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

77—Perma stony loam, 2 to 12 percent slopes

Composition

Perma and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 2 to 12 percent
Elevation: 3,500 to 4,500 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Stony loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Perma variant soils
- Perma gravelly loam
- Soils that have a substratum of sand and gravel

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Perma Variant

The Perma variant consists of very deep, well drained soils that formed in alpine till. These soils are on moraines. Slope is 2 to 30 percent. Elevation is 3,800 to 4,700 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is

42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed Typic Argiborolls

Typical Pedon

Perma variant stony silt loam, 2 to 8 percent slopes, in an area of rangeland, 1,900 feet north and 1,000 feet east of the southwest corner of sec. 27, T. 15 N., R. 14 W.

A—0 to 12 inches; dark grayish brown (10YR 4/2) stony silt loam, very dark grayish brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; 10 percent pebbles, 3 percent stones; slightly acid; gradual smooth boundary.

Bt1—12 to 24 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 4/3) moist; slightly hard, friable, sticky and plastic; many very fine and fine roots; common moderately thick clay films on faces of peds; 30 percent pebbles, 10 percent cobbles; neutral; clear smooth boundary.

Bt2—24 to 33 inches; very pale brown (10YR 7/3) very gravelly clay loam, brown (10YR 5/3) moist; hard, friable, sticky and plastic; common very fine and fine roots; many moderately thick clay films on faces of peds; 40 percent pebbles, 5 percent cobbles; neutral; clear smooth boundary.

Bk—33 to 60 inches; light gray (10YR 7/2) very gravelly clay loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; 40 percent pebbles, 10 percent cobbles; strongly effervescent; moderately alkaline.

Range in Characteristics

A horizon

Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 15 to 25 percent
Content of rock fragments: 2 to 15 percent—2 to 5 percent stones, 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.3

Bt horizon

Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles and stones, 30 to 45 percent pebbles
Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 15 to 30 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles and stones, 30 to 45 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

78—Perma variant stony silt loam, 2 to 8 percent slopes

Composition

Perma variant and similar soils: 90 percent
Inclusions: 10 percent

Setting

Landform: Moraines
Slope: 2 to 8 percent
Elevation: 3,800 to 4,200 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Stony silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Perma and similar soils
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

79—Perma variant-Perma complex, 4 to 30 percent slopes

Composition

Perma variant and similar soils: 50 percent
Perma and similar soils: 30 percent
Inclusions: 20 percent

Setting

Landform:
- Perma variant—Moraines
- Perma—Stream terraces

Slope:
- Perma variant—4 to 30 percent
- Perma—4 to 30 percent

Elevation: 4,200 to 4,700 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 60 to 90 days

Component Description

Perma variant
Surface layer texture: Stony silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.5 inches

Perma
Surface layer texture: Stony loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Very stony soils
- Soils that have a light-colored surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Petty Series

The Petty series consists of very deep, somewhat excessively drained soils that formed in material derived mainly from igneous rock. The surface layer of these soils has a high content of volcanic ash. The soils are on mountain slopes. Slope is 8 to 80 percent. Elevation is 4,500 to 6,900 feet. The average annual precipitation is 35 to 50 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Andic Cryochrepts

Typical Pedon

Petty gravelly loam, 8 to 30 percent slopes, in a forested area, 400 feet west and 300 feet south of the northeast corner of sec. 4, T. 10 N., R. 23 W.

Oi—3 inches to 0; undecomposed and slightly decomposed forest litter.

Bs—0 to 12 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine pores; 20 percent pebbles; medium acid; clear smooth boundary.

2E—12 to 24 inches; very pale brown (10YR 7/4) very gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine pores; 35 percent pebbles, 5 percent cobbles; medium acid; gradual wavy boundary.

2E and Bt—24 to 36 inches; 70 percent very pale brown (10YR 7/4) very gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist (E part); 30 percent strong brown (7.5YR 5/6) lamellae of fine sandy loam ⅛ to ½ inch thick, brown (7.5YR 4/4) moist (Bt part); weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine pores; 45 percent pebbles, 10 percent cobbles; slightly acid; gradual wavy boundary.

2C—36 to 60 inches; very pale brown (10YR 7/4) extremely gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and

fine roots and pores; 50 percent pebbles, 15 percent cobbles; slightly acid.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between depths of 8 and 24 inches
Control section: 5 to 15 percent clay; more than 50 percent of the sand fraction is coarse sand or very coarse sand
Other features: A thin discontinuous horizon on the surface in some pedons

Bs horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 4 to 6
Clay content: 7 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles and stones, 15 to 25 percent pebbles
Moist bulk density: More than 0.95 g/cc
Reaction: pH 5.6 to 6.5

2E horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 to 6
Texture: Coarse sandy loam; coarse or very coarse sand in more than 50 percent of the sand fraction
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 55 percent—5 to 10 percent cobbles and stones, 30 to 45 percent pebbles
Reaction: pH 5.6 to 6.5

2E and Bt horizon
Hue: E part—10YR or 7.5YR
Value: E part—6 or 7 dry and 4 or 5 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—3 to 6; B part—3 to 6
Clay content: 5 to 15 percent; less than 3 percent clay increase in lamellae
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles and stones, 30 to 45 percent pebbles
Reaction: pH 5.6 to 6.5

2C horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 to 6
Texture: Coarse sandy loam or loamy coarse sand
Clay content: 5 to 15 percent
Content of rock fragments: 45 to 70 percent—5 to 15 percent cobbles and stones, 40 to 55 percent pebbles
Reaction: pH 5.6 to 6.5

80—Petty gravelly loam, 8 to 30 percent slopes

Composition

Petty and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 35 to 45 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Material weathered from igneous rock
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Somewhat poorly drained soils
- Poorly drained soils
- Chickaman and similar soils
- Selway and similar soils
- Soils that are very gravelly loamy sand
- Petty bouldery loam

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

81—Petty gravelly loam, 30 to 60 percent slopes

Composition

Petty and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 35 to 45 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Material weathered from igneous rock
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chickaman and similar soils
- Selway and similar soils
- Petty bouldery loam
- Soils that are very gravelly loamy sand
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

82—Petty bouldery loam, 30 to 60 percent slopes

Composition

Petty and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 35 to 45 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Bouldery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Material weathered from igneous rock
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Petty gravelly loam
- Very bouldery soils
- Soils that are very gravelly loamy sand
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

83—Petty gravelly loam, cool, 8 to 30 percent slopes

Composition

Petty and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 6,000 to 6,900 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Material weathered from igneous rock
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Lolopeak and similar soils
- Poorly drained soils
- Somewhat poorly drained soils
- Soils that support Douglas-fir and larch
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

84—Petty bouldery loam, cool, 50 to 80 percent slopes

Composition

Petty and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 50 to 80 percent
Elevation: 6,000 to 6,900 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Bouldery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Material weathered from igneous rock
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Lolopeak and similar soils
- Soils that support Douglas-fir and larch
- Areas of rock outcrop
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

85—Petty, cool-Rock outcrop complex, 50 to 80 percent slopes

Composition

Petty and similar soils: 60 percent
Rock outcrop: 25 percent
Inclusions: 15 percent

Setting

Landform:
- Petty—Mountains
- Rock outcrop—Mountains

Slope:
- Petty—50 to 80 percent
- Rock outcrop—50 to 80 percent

Elevation: 6,000 to 6,900 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 40 to 60 days

Component Description

Petty
Surface layer texture: Bouldery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Material weathered from igneous rock
Native plant cover type: Forest land

Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

Rock outcrop

Definition: Exposures of granite or gneiss bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Lolopeak and similar soils
- Soils that support Douglas-fir and larch
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Phillcher Series

The Phillcher series consists of very deep, somewhat excessively drained soils that formed in colluvium and alpine till derived from argillite and quartzite. The surface layer of these soils has a high content of volcanic ash. The soils are on moraines and mountains. Slope is 4 to 80 percent. Elevation is 6,000 to 8,000 feet. The average annual precipitation is 50 to 80 inches, the average annual air temperature is 33 to 36 degrees F, and the frost-free season is 30 to 40 days.

Taxonomic Class: Loamy-skeletal, mixed Andic Cryochrepts

Typical Pedon

Phillcher silt loam, 4 to 30 percent slopes, in a forested area, 1,000 feet west of the east quarter corner of sec. 12, T. 17 N., R. 17 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

Bs—0 to 10 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 10 percent pebbles; medium acid; clear wavy boundary.

2Bw—10 to 24 inches; light gray (2.5Y 7/2) very gravelly sandy loam, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 5 percent cobbles, 45 percent pebbles; medium acid; gradual wavy boundary.

2C—24 to 60 inches; light gray (2.5Y 7/2) extremely gravelly sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; 10 percent cobbles, 55 percent pebbles; medium acid.

Range in Characteristics

Soil temperature: 35 to 38 degrees F
Moisture control section: Between depths of 8 and 24 inches
Content of clay in the control section: 0 to 10 percent

Bs horizon
Hue: 10YR or 7.5YR
Value: 4 to 6 dry; 2 to 4 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 0 to 35 percent pebbles
Reaction: pH 5.6 to 6.0
Moist bulk density: 0.95 g/cc or less

2Bw horizon
Hue: 10YR, 7.5YR, or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles, 35 to 50 percent pebbles
Reaction: pH 5.6 to 6.0

2C horizon
Hue: 10YR, 7.5YR, or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Sandy loam or loamy sand
Clay content: 0 to 10 percent
Content of rock fragments: 60 to 80 percent—5 to 20 percent cobbles, 55 to 60 percent pebbles
Reaction: pH 5.6 to 6.0

86—Phillcher silt loam, 4 to 30 percent slopes

Composition

Phillcher and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent

Elevation: 6,000 to 8,000 feet
Mean annual precipitation: 50 to 80 inches
Frost-free period: 30 to 40 days

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Coerock and similar soils
- Poorly drained soils
- Holloway, cool, soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

87—Phillcher-Rock outcrop complex, 50 to 80 percent slopes

Composition

Phillcher and similar soils: 60 percent
Rock outcrop: 20 percent
Inclusions: 20 percent

Setting

Landform:
- Phillcher—Mountains
- Rock outcrop—Mountains

Slope:
- Phillcher—50 to 80 percent
- Rock outcrop—50 to 80 percent

Elevation: 6,000 to 8,000 feet
Mean annual precipitation: 50 to 80 inches
Frost-free period: 30 to 40 days

Component Description

Phillcher
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.2 inches

Rock outcrop
Definition: Exposures of argillite or quartzite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Coerock and similar soils
- Holloway, cool, soils
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

88—Pits, gravel

Composition

Pits: 100 percent

Setting

Landform: Stream terraces

Component Description

Definition: Open excavations from which soil material and gravel have been removed
Dominant parent material: Alluvium

Repp Series

The Repp series consists of very deep, well drained soils that formed in colluvium derived from argillite and limestone. These soils are on mountain slopes. Slope is 8 to 80 percent. Elevation is 3,500 to 5,600 feet. The

average annual precipitation is 17 to 25 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 70 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Typic Ustochrepts

Typical Pedon

Repp very gravelly loam, 30 to 60 percent slopes, in a forested area, 300 feet north and 400 feet east of the south quarter corner of sec. 8, T. 14 N., R. 21 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 5 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 40 percent pebbles; slightly effervescent; mildly alkaline; clear smooth boundary.

E2—5 to 12 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 45 percent pebbles; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw—12 to 24 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 50 percent pebbles; few lime coatings on pebbles; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—24 to 40 inches; very pale brown (10YR 7/3) extremely gravelly loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; 70 percent pebbles; thin lime coatings on undersides of pebbles; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—40 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; 65 percent pebbles; thin lime coatings on undersides of pebbles; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between depths of 8 and 24 inches
Content of clay in the control section: 10 to 20 percent
Depth to Bk horizon: 13 to 36 inches

E horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 20 to 50 percent—0 to 10 percent cobbles and stones, 20 to 50 percent pebbles
Reaction: pH 6.1 to 7.8

Bw horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles, 35 to 50 percent pebbles
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR or 2.5Y
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 60 to 85 percent—0 to 10 percent cobbles, 60 to 75 percent pebbles
Calcium carbonate equivalent: 10 to 15 percent
Reaction: pH 7.4 to 9.0

89—Repp very gravelly loam, 30 to 60 percent slopes

Composition

Repp and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, southwest aspect
Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 25 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winkler and similar soils
- Soils that are shallow over bedrock
- Repp soils on cooler aspects
- Soils on warmer, drier aspects
- Soils that have a clayey subsoil
- Areas of rock outcrop and rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

90—Repp very gravelly loam, cool, 8 to 30 percent slopes

Composition

Repp and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,000 to 5,500 feet
Mean annual precipitation: 17 to 25 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winkler, cool, soils
- Trapps and similar soils
- Repp soils on warmer aspects

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

91—Repp very gravelly loam, cool, 30 to 60 percent slopes

Composition

Repp and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, northeast aspect
Elevation: 4,000 to 5,500 feet
Mean annual precipitation: 17 to 25 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winkler, cool, soils
- Trapps and similar soils
- Repp soils on warmer aspects
- Soils that do not contain rock fragments

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section

- Wildlife habitat section
- Engineering and soil properties sections

92—Repp-Rock outcrop complex, 50 to 80 percent slopes

Composition

Repp and similar soils: 40 percent
Rock outcrop: 35 percent
Inclusions: 25 percent

Setting

Landform:
- Repp—Mountains
- Rock outcrop—Mountains

Slope:
- Repp—50 to 80 percent, southwest aspect
- Rock outcrop—50 to 80 percent

Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 25 inches
Frost-free period: 70 to 90 days

Component Description

Repp
Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.9 inches

Rock outcrop
Definition: Exposures of limestone or argillite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winkler and similar soils
- Soils that are shallow over bedrock
- Repp soils on cooler aspects
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

93—Riverwash

Composition

Riverwash: 90 percent
Inclusions: 10 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Definition: Areas of sandy, silty, clayey, or gravelly sediments that are frequently reworked by water and that support little or no permanent vegetation
Dominant parent material: Alluvium
Flooding: Frequent

Inclusions

- Poorly drained soils
- Areas of soils that are frequently flooded

Rochester Series

The Rochester series consists of very deep, excessively drained soils that formed in colluvium derived from igneous rock. These soils are on mountain slopes. Slope is 30 to 60 percent. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 17 to 25 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Ustorthents

Typical Pedon

Rochester gravelly sandy loam, warm, in an area of Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes; in a forested area, 1,000 feet south and 800 feet east of the west quarter corner of sec. 15, T. 13 N., R. 14 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

A—0 to 7 inches; light brownish gray (2.5Y 6/2) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 15 percent pebbles; neutral; clear wavy boundary.

C1—7 to 12 inches; light brownish gray (2.5Y 6/2) gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; weak medium and coarse subangular blocky structure; soft, very friable,

nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 20 percent pebbles; neutral; gradual wavy boundary.

C2—12 to 60 inches; light brownish gray (2.5Y 6/2) very gravelly loamy coarse sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; 45 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 40 to 47 degrees F
Moisture control section: Between depths of 12 and 35 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 1 to 3
Clay content: 0 to 10 percent
Content of rock fragments: 15 to 60 percent—0 to 25 percent cobbles, stones, and boulders and 15 to 35 percent pebbles
Reaction: pH 6.6 to 7.3

C1 horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Loamy sand, loamy coarse sand, sandy loam, coarse sandy loam, or coarse sand; medium sand or coarser textures in 50 percent or more of the sand fraction
Clay content: 0 to 10 percent
Content of rock fragments: 15 to 80 percent—0 to 40 percent cobbles, stones, and boulders and 15 to 30 percent pebbles
Reaction: pH 5.6 to 7.3

C2 horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Loamy sand, loamy coarse sand, sand, or coarse sand; medium sand or coarser textures in 50 percent or more of the sand fraction
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 80 percent—0 to 40 percent cobbles, stones, and boulders and 20 to 60 percent pebbles
Reaction: pH 5.6 to 7.8

94—Rock outcrop-Rubble land complex

Composition

Rock outcrop: 45 percent
Rubble land: 45 percent
Inclusions: 10 percent

Setting

Landform:
- Rock outcrop—Mountains
- Rubble land—Mountains

Position on the landform:
- Rock outcrop—Shoulders and summits
- Rubble land—Shoulders and summits

Slope:
- Rock outcrop—30 to 90 percent
- Rubble land—30 to 90 percent

Component Description

Rock outcrop
Definition: Exposures of bare bedrock

Rubble land
Definition: Areas in which stones or boulders cover more than 90 percent of the soil surface

Inclusions

- Soils that are shallow over bedrock
- Very deep soils

Rumblecreek Series

The Rumblecreek series consists of very deep, well drained soils that formed in alpine till. These soils are on moraines. Slope is 4 to 30 percent. Elevation is 3,800 to 4,500 feet. The average annual precipitation is 25 to 40 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed Typic Eutroboralfs

Typical Pedon

Rumblecreek gravelly loam, 4 to 30 percent slopes, in a forested area, 2,150 feet south and 1,700 feet west of the northeast corner of sec. 12, T. 21 N., R. 17 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 8 inches; pale brown (10YR 6/3) gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 25 percent pebbles; medium acid; gradual wavy boundary.

E2—8 to 20 inches; light gray (10YR 7/2) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine and medium roots; many fine pores; 30 percent pebbles; medium acid; gradual wavy boundary.

Bt/E—20 to 32 inches; 60 percent yellowish brown

(10YR 5/6) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist (Bt part); 40 percent light gray (10YR 7/2) very gravelly loam, brown (10YR 5/3) moist (E part); when mixed, texture is very gravelly clay loam; moderate coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common fine roots and pores; 35 percent pebbles, 5 percent cobbles; common thin clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt—32 to 60 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; common fine pores; 40 percent pebbles, 5 percent cobbles; common moderately thick clay films on faces of peds and on pebbles; slightly acid.

Range in Characteristics

Soil temperature: 40 to 46 degrees F
Moisture control section: Between depths of 4 and 12 inches
Depth to argillic horizon: 10 to 22 inches
Other features: An E/Bt horizon in some pedons

E horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles, 15 to 30 percent pebbles
Reaction: pH 5.1 to 7.3

Bt/E horizon
Hue: B part—10YR or 7.5YR; E part—10YR or 7.5YR
Value: B part—5 or 6 dry and moist; E part—6 or 7 dry and 5 or 6 moist
Chroma: B part—3 to 6; E part—2 or 3
Texture: Loam, clay loam, or sandy clay loam
Clay content, mixed: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles, 35 to 50 percent pebbles
Reaction: pH 5.6 to 7.8

Bt horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 to 6
Texture: Clay loam or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles, 35 to 50 percent pebbles
Reaction: pH 5.6 to 7.8

95—Rumblecreek gravelly loam, 4 to 30 percent slopes

Composition

Rumblecreek and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent
Elevation: 3,800 to 4,500 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Hollandlake and similar soils
- Poorly drained soils
- Winfall and similar soils
- Glaciercreek soils on terraces

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Selway Series

The Selway series consists of very deep, somewhat excessively drained soils that formed in material derived from igneous rock and colluvium. These soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 4,200 to 5,500 feet. The average annual precipitation is 25 to 35 inches, the average annual air temperature is

40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Dystric Eutrochrepts

Typical Pedon

Selway gravelly sandy loam, 8 to 30 percent slopes, in a forested area, 2,000 feet west and 1,500 feet south of the northeast corner of sec. 17, T. 11 N., R. 23 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 8 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 20 percent pebbles; slightly acid; clear wavy boundary.

E2—8 to 18 inches; light gray (10YR 7/2) gravelly sandy loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine pores; 30 percent pebbles; slightly acid; clear wavy boundary.

E and Bt1—18 to 35 inches; 75 percent very pale brown (10YR 7/3) very gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist (E part); 25 percent few thin lamellae of yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist (Bt part); when mixed, texture is very gravelly coarse sandy loam; weak fine and moderate subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine pores; 55 percent pebbles; medium acid; abrupt wavy boundary.

E and Bt2—35 to 51 inches; 75 percent brownish yellow (10YR 6/6) very gravelly coarse sandy loam, yellowish brown (10YR 5/6) moist (E part); 25 percent few thin lamellae of yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist (Bt part); when mixed, texture is very gravelly coarse sandy loam; weak fine and medium subangular blocky structure; slightly hard, firm, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine pores; 60 percent pebbles; medium acid; diffuse irregular boundary.

BC—51 to 60 inches; brownish yellow (10YR 6/6) very gravelly loamy coarse sand, yellowish brown (10YR 5/6) moist; single grain; loose, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine pores; 45 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 8 and 24 inches
Control section: 5 to 15 percent clay; more than 50 percent coarse or very coarse sand

E horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles, stones, and boulders and 15 to 30 percent angular pebbles
Reaction: pH 6.1 to 7.3
Note: In some pedons the upper 3 to 5 inches of the E horizon is dark colored; however, it does not meet the requirements for a mollic epipedon where mixed to a depth of 7 inches.

E and Bt horizon
Value: E part—6 or 7 dry and 5 or 6 moist; B part—4 to 6 dry and 3 or 4 moist
Chroma: E part—3 or 4; B part—4 to 6
Clay content, mixed: 5 to 15 percent
Content of rock fragments: 35 to 75 percent pebbles
Reaction: pH 5.6 to 6.5

BC horizon
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 3 to 6
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 80 percent—0 to 10 percent stones, 35 to 70 percent pebbles
Reaction: pH 5.6 to 6.5

96—Selway gravelly sandy loam, 8 to 30 percent slopes

Composition

Selway and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained
Dominant parent material: Material weathered from igneous rock
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Petty and similar soils
- Soils that are very gravelly loamy sand
- Soils that have a stony surface layer
- Soils that have a bouldery surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

97—Selway gravelly sandy loam, 30 to 60 percent slopes

Composition

Selway and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, southwest aspect
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Petty and similar soils
- Soils that are very gravelly loamy sand
- Soils that have a stony surface layer
- Soils that have a bouldery surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

98—Selway bouldery sandy loam, 30 to 60 percent slopes

Composition

Selway and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, southwest aspect
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Bouldery sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Petty and similar soils
- Soils that are very gravelly loamy sand

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Sharrott Series

The Sharrott series consists of shallow, well drained soils that formed in material derived from argillite or quartzite bedrock. These soils are on mountain slopes. Slope is 4 to 40 percent. Elevation is 3,500 to 5,500 feet. The average annual precipitation is 17 to 30 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 75 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Lithic Ustochrepts

Typical Pedon

Sharrott gravelly loam, in an area of Sharrott-Rock outcrop complex, 4 to 30 percent slopes; in a forested area, 1,000 feet south and 150 feet east of the northwest corner of sec. 23, T. 14 N., R. 15 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

A—0 to 4 inches; brown (10YR 5/3) gravelly loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 20 percent pebbles; slightly acid; clear smooth boundary.

Bw—4 to 13 inches; light yellowish brown (10YR 6/4) very gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 40 percent pebbles; medium acid; abrupt wavy boundary.

BC—13 to 15 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; few medium and coarse roots; 70 percent pebbles; medium acid; abrupt irregular boundary.

R—15 inches; fractured argillite bedrock.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between depths of 8 and 24 inches
Content of clay in the control section: 10 to 15 percent
Depth to bedrock: 10 to 20 inches
Content of rock fragments: 35 to 80 percent in the control section

A horizon
Hue: 10YR or 7.5YR
Value: 4 or 5 dry; 2 to 4 moist
Chroma: 2 or 3
Clay content: 10 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 25 percent angular cobbles and stones, 15 to 25 percent angular pebbles
Reaction: pH 5.6 to 7.3
Note: Some pedons have a thin E horizon.

Bw horizon
Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 10 to 15 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent angular cobbles, 35 to 50 percent angular pebbles
Reaction: pH 5.6 to 7.3

BC horizon
Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 or 3
Clay content: 10 to 15 percent
Content of rock fragments: 65 to 80 percent—0 to 10 percent angular cobbles, 65 to 70 percent angular pebbles
Reaction: pH 5.6 to 6.5

99—Sharrott-Rock outcrop complex, 4 to 30 percent slopes

Composition

Sharrott and similar soils: 60 percent
Rock outcrop: 20 percent
Inclusions: 20 percent

Setting

Landform:
- Sharrott—Mountains
- Rock outcrop—Mountains

Slope: 4 to 30 percent
Elevation: 3,500 to 5,500 feet
Mean annual precipitation: 17 to 25 inches
Frost-free period: 75 to 90 days

Component Description

Sharrott
Surface layer texture: Gravelly loam

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 1.5 inches

Rock outcrop

Definition: Exposures of argillite or quartzite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winkler soils on warm aspects
- Winkler, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Shooflin Series

The Shooflin series consists of deep, well drained soils that formed in mudstone residuum. These soils are on hills. Slope is 4 to 15 percent. Elevation is 3,500 to 4,500 feet. The average annual precipitation is 16 to 22 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Very fine, montmorillonitic Typic Eutroboralfs

Typical Pedon

Shooflin silt loam, 4 to 15 percent slopes, in a forested area, 1,300 feet north and 500 feet west of the southeast corner of sec. 26, T. 14 N., R. 17 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 4 inches; light gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate thin platy structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; many very fine pores; medium acid; clear wavy boundary.

E2—4 to 12 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; moderate medium platy structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine pores; medium acid; abrupt smooth boundary.

Bt1—12 to 19 inches; light brownish gray (2.5Y 6/2) clay, olive brown (2.5Y 4/4) moist; strong medium prismatic structure; extremely hard, extremely firm, very sticky and very plastic; common fine and medium roots; few medium pores; thin continuous clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—19 to 25 inches; light brownish gray (2.5Y 6/2) clay, light olive brown (2.5Y 5/4) moist; strong medium prismatic structure; extremely hard, extremely firm, very sticky and very plastic; common fine and medium roots; few medium pores; thin continuous clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—25 to 40 inches; pale yellow (2.5Y 7/4) clay, light yellowish brown (2.5Y 6/4) moist; moderate medium angular blocky structure; hard, very firm, very sticky and very plastic; common fine and medium roots; common very fine pores; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.

Bt4—40 to 51 inches; yellow (2.5Y 7/6) clay, light yellowish brown (2.5Y 6/4) moist; moderate fine angular blocky structure; hard, very firm, sticky and very plastic; few fine roots; common very fine pores; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.

Cr—51 to 60 inches; pale yellow (2.5Y 7/4), fractured, semiconsolidated sedimentary mudstone beds that texture to silt loam, light gray (2.5Y 7/2) moist.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 4 and 12 inches
Content of clay in the control section: 60 to 80 percent
Depth to paralithic contact: 40 to 60 inches

E horizon

Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 3 to 6 moist
Chroma: 1 to 3
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles, 0 to 5 percent pebbles
Reaction: pH 5.1 to 6.0

Bt horizon

Hue: 2.5Y, 10YR, or 7.5YR
Value: 4 to 7 dry; 4 to 6 moist
Chroma: 2 to 6

Clay content: 60 to 80 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles, 0 to 5 percent pebbles
Reaction: pH 4.5 to 6.0

Cr horizon
Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 5 to 7 moist
Chroma: 2 to 5
Sedimentary beds: Semiconsolidated or weakly consolidated mudstone or siltstone
Reaction: pH 4.5 to 6.0

100—Shooflin silt loam, 4 to 15 percent slopes

Composition

Shooflin and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 4 to 15 percent
Elevation: 3,500 to 4,500 feet
Mean annual precipitation: 16 to 22 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silt loam
Depth class: Deep (40 to 60 inches)
Drainage class: Well drained
Dominant parent material: Mudstone residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 8.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bignell and similar soils
- Poorly drained soils
- Crow and similar soils
- Lubrecht and similar soils
- Winkler, cool, soils
- Somewhat poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Tally Variant

The Tally variant consists of very deep, somewhat excessively drained soils that formed in alluvium. These soils are on stream terraces. Slope is 0 to 4 percent. Elevation is 3,300 to 4,200 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Sandy, mixed Typic Haploborolls

Typical Pedon

Tally variant sandy loam, 0 to 4 percent slopes, in an area of hayland, 2,300 feet west and 100 feet north of the southeast corner of sec. 23, T. 14 N., R. 15 W.

A—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; slightly acid; clear wavy boundary.

Bw—10 to 20 inches; yellowish brown (10YR 5/4) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; slightly acid; clear wavy boundary.

C1—20 to 30 inches; brown (10YR 5/3) loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; common very fine pores; neutral; gradual wavy boundary.

C2—30 to 48 inches; multicolored sand; single grain; loose, nonsticky and nonplastic; few very fine roots and pores; neutral; gradual wavy boundary.

C3—48 to 60 inches; multicolored gravelly sand; single grain; loose, nonsticky and nonplastic; 30 percent pebbles; neutral.

Range in Characteristics

A horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 3 to 5 dry; 2 to 4 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 7.3

Bw horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 to 4 moist
Chroma: 2 to 4
Clay content: 5 to 15 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 7.3

C horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 0 to 35 percent pebbles
Reaction: pH 6.6 to 7.3

101—Tally variant sandy loam, 0 to 4 percent slopes

Composition

Tally variant and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 4 percent
Elevation: 3,300 to 4,200 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Perma and similar soils
- Totelake and similar soils
- Areas of soils that are occasionally flooded

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Tevis Series

The Tevis series consists of very deep, somewhat excessively drained soils that formed in colluvium derived from argillite and quartzite. These soils are on mountain slopes. Slope is 8 to 70 percent. Elevation is 4,200 to 6,000 feet. The average annual precipitation is 25 to 40 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Dystric Eutrochrepts

Typical Pedon

Tevis gravelly loam, in an area of Mitten-Tevis complex, 30 to 60 percent slopes; in a forested area, 500 feet north and 1,000 feet east of the southwest corner of sec. 19, T. 12 N., R. 23 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

A—0 to 3 inches; brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 30 percent pebbles; medium acid; abrupt wavy boundary.

E1—3 to 14 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 50 percent pebbles; slightly acid; clear wavy boundary.

E2—14 to 22 inches; light gray (10YR 7/2) extremely gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 60 percent pebbles, 5 percent cobbles; slightly acid; clear wavy boundary.

E/Bw—22 to 60 inches; 80 percent very pale brown (10YR 7/3) extremely gravelly sandy loam, brown (10YR 5/3) moist (E part); 20 percent pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist (Bw part); weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine

pores; 60 percent pebbles, 10 percent cobbles; slightly acid.

Range in Characteristics

Soil temperature: 40 to 46 degrees F
Moisture control section: Between depths of 8 and 24 inches
Control section: 5 to 10 percent clay and 60 to 85 percent rock fragments

A horizon
Hue: 10YR or 7.5YR
Value: 4 to 6 dry
Chroma: 2 or 3
Clay content: 10 to 15 percent
Content of rock fragments: 15 to 60 percent—0 to 5 percent cobbles, 15 to 30 percent pebbles
Reaction: pH 5.6 to 7.3

E1 horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles, 35 to 50 percent pebbles
Reaction: pH 5.6 to 7.3

E2 horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 5 to 10 percent
Content of rock fragments: 60 to 80 percent—0 to 10 percent cobbles, 60 to 70 percent pebbles
Reaction: pH 5.6 to 7.3

E/Bw horizon
Hue: E part—10YR or 7.5YR
Value: E part—6 or 7 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; B part—2 to 4
Texture: Sandy loam, fine sandy loam, or loam
Clay content: 5 to 10 percent
Content of rock fragments: 60 to 85 percent—0 to 10 percent cobbles, 60 to 75 percent pebbles
Reaction: pH 6.1 to 7.3

102—Tevis gravelly loam, 30 to 60 percent slopes

Composition

Tevis and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Beeskove and similar soils
- Mitten and similar soils
- Winkler, cool, soils
- Soils that have volcanic ash in the surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

103—Tevis-Mitten complex, 8 to 30 percent slopes

Composition

Tevis and similar soils: 45 percent
Mitten and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Tevis—Mountains
- Mitten—Mountains

Slope:
- Tevis—8 to 30 percent
- Mitten—8 to 30 percent

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Tevis
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.8 inches

Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Holloway and similar soils
- Winkler, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

104—Tevis-Mitten-Rock outcrop complex, 45 to 70 percent slopes

Composition

Tevis and similar soils: 40 percent
Mitten and similar soils: 25 percent
Rock outcrop: 15 percent
Inclusions: 20 percent

Setting

Landform:
- Tevis—Mountains
- Mitten—Mountains
- Rock outcrop—Mountains

Slope:
- Tevis—45 to 70 percent
- Mitten—45 to 70 percent
- Rock outcrop—45 to 70 percent

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 25 to 40 inches
Frost-free period: 60 to 90 days

Component Description

Tevis
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.8 inches

Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

Rock outcrop
Definition: Exposures of argillite or quartzite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Evaro and similar soils
- Sharrott, cool, soils
- Winkler, cool, soils
- Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section

- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Totelake Series

The Totelake series consists of very deep, excessively drained soils that formed in alluvium. These soils are on stream terraces and hills. Slope is 2 to 30 percent. Elevation is 3,200 to 4,200 feet. The average annual precipitation is 15 to 20 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 70 to 90 days.

Taxonomic Class: Sandy-skeletal, mixed, frigid Udic Ustochrepts

Typical Pedon

Totelake gravelly loam, 2 to 8 percent slopes, in a forested area, 2,100 feet south and 1,100 feet east of the northwest corner of sec. 20, T. 15 N., R. 14 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.

A—0 to 7 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many fine and medium pores; 10 percent cobbles, 20 percent pebbles; neutral; clear wavy boundary.

Bw—7 to 22 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 1 percent stones, 15 percent cobbles, 35 percent pebbles; neutral; gradual wavy boundary.

2C—22 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; 2 percent stones, 20 percent cobbles, 50 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between depths of 12 and 35 inches

Other features: A layer of volcanic ash in the top 2 to 4 inches of the surface layer in some pedons; this layer does not meet the thickness or bulk density requirements for the andic intergrades. Faint lime cast on the undersides of rock fragments and some disseminated lime occurs in lower horizons in areas of calcareous till or limestone rock.

A horizon

Value: 4 to 6 dry; 2 to 4 moist
Chroma: 1 to 3
Clay content: 8 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 15 percent cobbles and stones, 15 to 20 percent pebbles
Reaction: pH 6.6 to 7.3

Bw horizon

Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles and stones, 35 to 45 percent pebbles
Reaction: pH 6.6 to 7.8

2C horizon

Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 60 to 80 percent—15 to 25 percent cobbles and stones, 45 to 55 percent pebbles
Reaction: pH 6.6 to 7.8

105—Totelake gravelly loam, 2 to 8 percent slopes

Composition

Totelake and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 2 to 8 percent
Elevation: 3,200 to 4,200 feet
Mean annual precipitation: 15 to 20 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glaciercreek and similar soils
- Poorly drained soils
- Perma and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

106—Totelake gravelly loam, 8 to 30 percent slopes

Composition

Totelake and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Hills
Slope: 8 to 30 percent
Elevation: 3,200 to 4,200 feet
Mean annual precipitation: 15 to 20 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glaciercreek and similar soils
- Perma and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

107—Totelake extremely stony loam, 2 to 8 percent slopes

Composition

Totelake and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 2 to 8 percent
Elevation: 3,200 to 3,800 feet
Mean annual precipitation: 15 to 20 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Extremely stony loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glaciercreek and similar soils
- Poorly drained soils
- Perma and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section

• Wildlife habitat section
• Engineering and soil properties sections

Trapps Series

The Trapps series consists of very deep, well drained soils that formed in colluvium derived from limestone or argillite. These soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 4,000 to 6,000 feet. The average annual precipitation is 18 to 25 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed Typic Eutroboralfs

Typical Pedon

Trapps gravelly loam, 30 to 60 percent slopes, in a forested area, 300 feet north and 800 feet east of the west quarter corner of sec. 21, T. 11 N., R. 20 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 10 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine pores; 25 percent pebbles; neutral; clear wavy boundary.

Bt—10 to 24 inches; yellowish brown (10YR 5/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; many very fine, fine, medium, and coarse roots; many very fine pores; common moderately thick clay films on faces of peds; 40 percent pebbles; mildly alkaline; clear wavy boundary.

Bk1—24 to 35 inches; very pale brown (10YR 7/3) very gravelly loam, yellowish brown (10YR 5/4) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine pores; lime coatings on undersides of pebbles; 50 percent pebbles; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—35 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; common very fine pores; lime coatings on undersides of rock fragments; 20 percent cobbles, 50 percent pebbles; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F
Moisture control section: Between depths of 4 and 12 inches
Depth to Bk horizon: 15 to 35 inches
Note: Some pedons have a dark A horizon less than 4 inches thick.

E horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Clay content: 10 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 20 percent cobbles, flagstones, and stones and 15 to 25 percent pebbles or channers
Reaction: pH 5.6 to 7.3

Bt horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 2 to 6
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles or flagstones, 35 to 50 percent pebbles or channers
Reaction: pH 6.6 to 8.4

Bk1 horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 2 to 8
Texture: Loam or sandy loam
Clay content: 10 to 15 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles, flagstones, or stones and 35 to 40 percent pebbles or channers
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

Bk2 horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 2 to 8
Texture: Loam or sandy loam
Clay content: 10 to 15 percent
Content of rock fragments: 45 to 85 percent—10 to 30 percent cobbles, flagstones, or stones and 50 to 55 percent pebbles or channers
Calcium carbonate equivalent: 10 to 35 percent
Reaction: pH 7.9 to 8.4

108—Trapps gravelly loam, 8 to 30 percent slopes

Composition

Trapps and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 4,000 to 6,000 feet
Mean annual precipitation: 18 to 25 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Beeskove and similar soils
• Repp, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

109—Trapps gravelly loam, 30 to 60 percent slopes

Composition

Trapps and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent
Elevation: 4,000 to 6,000 feet
Mean annual precipitation: 18 to 25 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Beeskove and similar soils
• Repp, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

Turrah Series

The Turrah series consists of very deep, poorly drained soils that formed in alluvium. These soils are on stream terraces. Slope is 0 to 2 percent. Elevation is 3,500 to 4,000 feet. The average annual precipitation is 15 to 22 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Fine, mixed, frigid Cumulic Haplaquolls

Typical Pedon

Turrah silty clay loam, 0 to 2 percent slopes, in an area of hayland, 1,300 feet east and 700 feet north of the southwest corner of sec. 21, T. 13 N., R. 15 W.

A1—0 to 4 inches; black (10YR 2/1) silty clay loam, black (10YR 2/1) dry; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; many very fine roots and pores; slightly acid; abrupt smooth boundary.

A2—4 to 12 inches; black (10YR 2/1) clay, black (10YR 2/1) dry; common fine distinct brownish yellow (10YR 6/6) mottles; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; many very fine roots and pores; neutral; clear smooth boundary.

Bg1—12 to 22 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; common medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; many very fine pores; common black (10YR 2/1) organic stains; neutral; clear smooth boundary.

Bg2—22 to 38 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; many fine and medium prominent brownish yellow (10YR 6/6) and dark brownish yellow (10YR 4/4) mottles; strong medium subangular blocky structure; very hard, firm, sticky and very plastic; common very fine and fine roots; common very fine pores; mildly alkaline; abrupt smooth boundary.

2Cg—38 to 60 inches; gray (5Y 5/1) very gravelly sandy clay loam, grayish brown (2.5Y 5/2) dry; common fine distinct brownish yellow (10YR 6/6) and dark brownish yellow (10YR 4/4) mottles; massive; very hard, friable, sticky and plastic; 60 percent pebbles; mildly alkaline.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between depths of 4 and 12 inches
Mollic epipedon thickness: 24 to 48 inches
Depth to a seasonal high water table: 12 to 24 inches
Note: Some pedons have an organic layer less than 3 inches thick.

A1 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4 dry; 2, 2.5, or 3 moist
Chroma: 1 or 2
Clay content: 27 to 40 percent
Reaction: pH 5.6 to 7.3

A2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4 dry; 2, 2.5, or 3 moist
Chroma: 1 or 2
Redox concentrations: 10YR 4/3, 10YR 4/4, 10YR 4/6, 10YR 5/6, 10YR 6/4, or 10YR 6/6
Texture: Clay, silty clay loam, or silty clay
Clay content: 35 to 60 percent
Reaction: pH 5.6 to 7.3

Bg horizon
Hue: 10YR, 2.5Y, or 5Y or neutral
Value: 4 to 6 dry; 2, 2.5, 3, 4, or 5 moist
Chroma: 0 to 3
Redox concentrations: 10YR 4/4, 10YR 4/6, 10YR 5/6, 10YR 6/4, 10YR 6/6, or 7.5YR 5/6
Texture: Clay, silty clay, silty clay loam, or clay loam
Clay content: 35 to 60 percent
Reaction: pH 6.6 to 7.8

2Cg horizon
Hue: 2.5Y or 5Y
Value: 4 to 6 dry; 4 or 5 moist
Chroma: 1 or 2
Redox concentrations: 10YR 6/6, 10YR 4/6, or 10YR 4/4
Texture: Sandy clay loam, sandy loam, or clay loam
Clay content: 20 to 40 percent
Content of rock fragments: 35 to 85 percent—0 to 35 percent cobbles, 20 to 60 percent pebbles
Reaction: pH 6.6 to 7.8

110—Turrah silty clay loam, 0 to 2 percent slopes

Composition

Turrah and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 3,500 to 4,000 feet
Mean annual precipitation: 15 to 22 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Alluvium
Flooding: None
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that have a lower content of clay
- Soils that have a substratum of sand and gravel
- Somewhat poorly drained soils
- Areas of soils that are occasionally flooded

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Udifluvents

Udifluvents consist of very deep, somewhat poorly drained to well drained soils that formed in alluvium. These soils are on flood plains. Slope is 0 to 2 percent. Elevation is 3,800 to 4,000 feet. The average annual precipitation is 24 to 26 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 35 to 60 days.

Typical Pedon

Udifluvents in an area of woodland, 1,000 feet south and 2,000 feet east of the northwest corner of sec. 1, T. 21 N., R. 17 W.

1 inch to 0; highly decomposed forest litter.

0 to 15 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 10 percent pebbles; neutral; clear wavy boundary.

15 to 24 inches; pinkish gray (7.5YR 6/2) very gravelly loamy sand, brown (7.5YR 4/2) moist; massive; loose, nonsticky and nonplastic; few very fine roots; 35 percent pebbles, 20 percent cobbles; neutral; gradual wavy boundary.

24 to 60 inches; pinkish gray (7.5YR 6/2) extremely gravelly sand, brown (7.5YR 4/2) moist; common distinct light reddish brown (5YR 6/4) and yellowish brown (10YR 5/6) mottles; single grain; loose, nonsticky and nonplastic; 50 percent pebbles, 30 percent cobbles; neutral.

Range in Characteristics

Surface texture: Loam to fine sandy loam
Subsurface texture: Loam to extremely gravelly sand
Depth to a seasonal high water table: 36 to more than 60 inches

111—Udifluvents, 0 to 2 percent slopes

Composition

Udifluvents and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 3,800 to 4,000 feet
Mean annual precipitation: 24 to 26 inches
Frost-free period: 35 to 60 days

Component Description

Depth class: Very deep (more than 60 inches)
Dominant parent material: Alluvium
Flooding: Frequent
Kind of water table: Apparent
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glaciercreek and similar soils
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Udorthents

Udorthents consist of very deep, excessively drained soils that formed in sandy alluvial deposits. These soils are on stream terraces. Slope is 0 to 8 percent. Elevation is 3,900 to 4,200 feet. The average annual precipitation is 22 to 23 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Typical Pedon

Udorthents in an area of woodland, 800 feet west and 1,000 feet north of the southeast corner of sec. 29, T. 17 N., R. 15 W.

2 inches to 0; undecomposed and slightly decomposed forest litter.

0 to 10 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; medium acid; clear wavy boundary.

10 to 52 inches; pink (5YR 7/3) loamy sand, reddish brown (5YR 5/3) moist; massive; loose, nonsticky and nonplastic; many fine and medium roots to a depth of 24 inches and few fine roots to a depth of 52 inches; discontinuous fine sandy loam bands ¼

to ½ inch thick that are 6 to 15 inches apart; medium acid; clear wavy boundary.

52 to 60 inches; light reddish brown (5YR 6/3) gravelly loamy sand, reddish brown (5YR 4/3) moist; massive; loose, nonsticky and nonplastic; few fine roots; 25 percent pebbles; slightly acid.

Range in Characteristics

Surface texture: Loam, fine sandy loam, or sandy loam

Subsurface texture: Loamy sand to loamy fine sand that has bands of fine sandy loam or sandy loam ¼ to ½ inch thick and 4 to 20 inches apart; below a depth of 40 inches, loamy sand, loamy fine sand, or sand textures and 0 to 35 percent pebbles and cobbles

112—Udorthents-Glaciercreek complex, 0 to 8 percent slopes

Composition

Udorthents and similar soils: 45 percent
Glaciercreek and similar soils: 40 percent
Inclusions: 15 percent

Setting

Landform:
- Udorthents—Stream terraces
- Glaciercreek—Stream terraces

Slope:
- Udorthents—0 to 8 percent
- Glaciercreek—0 to 8 percent

Elevation: 3,900 to 4,200 feet
Mean annual precipitation: 22 to 23 inches
Frost-free period: 60 to 90 days

Component Description

Udorthents

Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Flooding: None
Note: The properties of these soils are highly variable.

Glaciercreek

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Glacial outwash
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Upsata and similar soils
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Upsata Series

The Upsata series consists of very deep, excessively drained soils that formed in glacial outwash. The surface layer of these soils has a high content of volcanic ash. The soils are on stream terraces in cool, narrow valleys that are affected by cold air drainage. Slope is 2 to 8 percent. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 22 to 30 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Sandy-skeletal, mixed Andic Cryochrepts

Typical Pedon

Upsata gravelly fine sandy loam, 2 to 8 percent slopes, in a forested area, 3,000 feet east and 1,200 feet south of the northwest corner of sec. 10, T. 16 N., R. 16 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 2 inches; pinkish gray (7.5YR 7/2) loam, brown (7.5YR 4/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine pores; 10 percent pebbles; medium acid; clear wavy boundary.

Bs—2 to 14 inches; light yellowish brown (10YR 6/4) gravelly fine sandy loam, brown (7.5YR 4/4) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine pores; 20 percent pebbles; medium acid; clear wavy boundary.

2C1—14 to 40 inches; pinkish gray (7.5YR 6/2) extremely gravelly loamy coarse sand, brown (7.5YR 5/2) moist; single grain; loose, nonsticky and

nonplastic; many very fine, fine, and medium roots; 50 percent pebbles, 20 percent cobbles; medium acid; gradual smooth boundary.

2C2—40 to 60 inches; pink (5YR 7/3) extremely gravelly loamy coarse sand, reddish gray (5YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; 50 percent pebbles, 20 percent cobbles; medium acid.

Range in Characteristics

Soil temperature: 38 to 42 degrees F
Moisture control section: Between depths of 12 and 35 inches
Content of clay in the control section: 1 to 6 percent
Note: Base saturation is more than 60 percent below a depth of 14 inches.

E horizon
Hue: 7.5YR
Value: 6 or 7 dry; 3 to 5 moist
Clay content: 7 to 15 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 5.1 to 6.5
Moist bulk density: 0.95 g/cc or less

Bs horizon
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 4 to 6
Clay content: 3 to 7 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles, 15 to 30 percent pebbles
Reaction: pH 5.6 to 6.5
Moist bulk density: 0.95 g/cc or less

2C horizon
Hue: 5YR, 2.5YR, or 7.5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loamy coarse sand, loamy sand, or sand
Clay content: 0 to 5 percent
Content of rock fragments: 80 to 85 percent—15 to 25 percent cobbles, 45 to 60 percent pebbles
Reaction: pH 5.1 to 6.5

113—Upsata gravelly fine sandy loam, 2 to 8 percent slopes

Composition

Upsata and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 2 to 8 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 22 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Glacial outwash
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Waldbillig and similar soils
- Poorly drained soils
- Soils that do not contain volcanic ash

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

114—Urban land

Composition

Urban land: 85 percent
Inclusions: 15 percent

Component Description

Definition: Areas in which most of the soil is covered by asphalt, concrete, or buildings and in which the exposed soil is highly disturbed

Inclusions

- Orthents
- Argixerolls
- Bigarm and similar soils
- Grassvalley and similar soils
- Desmet and similar soils
- Grantsdale and similar soils

Waldbillig Series

The Waldbillig series consists of very deep, well drained soils that formed in alpine till. The surface layer of these soils has a high content of volcanic ash. The soils are on moraines. Slope is 4 to 60 percent. Elevation is 3,800 to 7,000 feet. The average annual precipitation is 28 to 50 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, mixed Andic Cryochrepts

Typical Pedon

Waldbillig gravelly silt loam, 4 to 30 percent slopes, in a forested area, 1,780 feet west and 1,320 feet north of the southeast corner of sec. 18, T. 17 N., R. 15 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

Bs—0 to 10 inches; light brown (7.5YR 6/4) gravelly silt loam, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 25 percent pebbles; medium acid; clear wavy boundary.

2E—10 to 26 inches; pink (5YR 7/3) very gravelly fine sandy loam, reddish brown (5YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and medium roots; many fine pores; 30 percent pebbles, 10 percent cobbles; slightly acid; gradual wavy boundary.

2E and Bt—26 to 60 inches; about 75 percent light reddish brown (5YR 6/3) very gravelly fine sandy loam, reddish brown (5YR 5/4) moist (E part); about 25 percent reddish brown (5YR 5/4) lamellae of very fine sandy loam ¼ to ½ inch thick with a combined thickness of 3 to 5 inches, dark reddish brown (5YR 3/4) moist (Bt part); when mixed, texture is very gravelly fine sandy loam; weak medium subangular blocky structure; very hard, very friable, nonsticky and nonplastic; few fine roots; many fine pores; 35 percent pebbles, 15 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between depths of 8 and 24 inches
Control section: 7 to 18 percent clay and more than 15 percent fine sand or coarser

Bs horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles, stones, and boulders and 15 to 25 percent pebbles
Moist bulk density: 0.95 g/cc or less
Reaction: pH 5.6 to 6.5

2E horizon
Hue: 5YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Fine sandy loam or sandy loam
Clay content: 7 to 18 percent
Content of rock fragments: 35 to 60 percent—5 to 10 percent cobbles, stones, and boulders and 30 to 50 percent pebbles
Reaction: pH 5.6 to 6.5

2E and Bt horizon
Hue: E part—5YR or 7.5YR; B part—5YR or 7.5YR
Value: E part—5 to 7 dry and 4 to 6 moist; B part—5 or 6 dry and 3 or 4 moist
Chroma: E part—3 or 4; B part—2 to 4
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 7 to 18 percent; less than 3 percent clay increase in lamellae
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles, stones, and boulders and 30 to 40 percent pebbles
Reaction: pH 6.1 to 7.3

115—Waldbillig gravelly silt loam, 4 to 30 percent slopes

Composition

Waldbillig and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent
Elevation: 3,800 to 5,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Auggie and similar soils
- Poorly drained soils
- Bata and similar soils
- Jimlake and similar soils
- Upsata soils on terraces

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

116—Waldbillig gravelly silt loam, 30 to 60 percent slopes

Composition

Waldbillig and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 30 to 60 percent
Elevation: 3,800 to 5,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bata and similar soils
- Holloway and similar soils
- Jimlake and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

117—Waldbillig-Auggie complex, 4 to 15 percent slopes

Composition

Waldbillig and similar soils: 45 percent
Auggie and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform:
- Waldbillig—Moraines
- Auggie—Moraines

Position on the landform:
- Waldbillig—Back slopes and shoulders
- Auggie—Foot slopes and toe slopes

Slope:
- Waldbillig—4 to 15 percent
- Auggie—4 to 15 percent

Elevation: 3,800 to 4,400 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 40 to 60 days

Component Description

Waldbillig
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

Auggie
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits

Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that do not contain volcanic ash
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

118—Waldbillig-Holloway gravelly silt loams, 8 to 30 percent slopes

Composition

Waldbillig and similar soils: 55 percent
Holloway and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:
- Waldbillig—Moraines
- Holloway—Moraines

Slope:
- Waldbillig—8 to 30 percent
- Holloway—8 to 30 percent

Elevation: 4,200 to 5,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Waldbillig
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bata and similar soils
- Poorly drained soils
- Courville and similar soils
- Hollandlake and similar soils
- Upsata soils on terraces
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

119—Waldbillig-Holloway gravelly silt loams, 30 to 60 percent slopes

Composition

Waldbillig and similar soils: 55 percent
Holloway and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:
- Waldbillig—Moraines
- Holloway—Mountains

Slope:
- Waldbillig—30 to 60 percent
- Holloway—30 to 60 percent

Elevation: 4,200 to 5,000 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 40 to 60 days

Component Description

Waldbillig
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bata and similar soils
- Courville and similar soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

120—Waldbillig-Holloway gravelly silt loams, cool, 8 to 30 percent slopes

Composition

Waldbillig and similar soils: 55 percent
Holloway and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:
- Waldbillig—Moraines
- Holloway—Moraines

Slope:
- Waldbillig—8 to 30 percent
- Holloway—8 to 30 percent

Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 40 to 60 days

Component Description

Waldbillig
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Coerock and similar soils
- Poorly drained soils
- Phillcher and similar soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

121—Waldbillig-Holloway gravelly silt loams, cool, 30 to 60 percent slopes

Composition

Waldbillig and similar soils: 55 percent

Holloway and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:
- Waldbillig—Mountains
- Holloway—Mountains

Slope:
- Waldbillig—30 to 60 percent
- Holloway—30 to 60 percent

Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 40 to 60 days

Component Description

Waldbillig
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Coerock and similar soils
- Phillcher and similar soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

W—Water

Description

Open areas of fresh water

Whitore Series

The Whitore series consists of very deep, well drained soils that formed in colluvium derived from limestone and calcareous argillite. These soils are on mountain slopes. Slope is 8 to 60 percent. Elevation is 5,000 to 6,000 feet. The average annual precipitation is 20 to 30 inches, the average annual air temperature is 37 to 42 degrees F, and the frost-free season is 40 to 60 days.

Taxonomic Class: Loamy-skeletal, carbonatic Typic Cryochrepts

Typical Pedon

Whitore gravelly clay loam, 30 to 60 percent slopes, in a forested area, 1,200 feet north and 1,200 feet east of the southwest corner of sec. 18, T. 12 N., R. 15 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

Bw—0 to 8 inches; yellowish brown (10YR 5/4) gravelly clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; soft, friable, sticky and plastic; many very fine, fine, and medium roots; many very fine and fine pores; 20 percent pebbles; neutral; clear smooth boundary.

Bk1—8 to 17 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; many very fine and fine pores; 40 percent pebbles; strongly effervescent; moderately alkaline; abrupt wavy boundary.

Bk2—17 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine pores; 50 percent pebbles; violently effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 38 to 42 degrees F
Moisture control section: Between depths of 4 and 12 inches
Depth to Bk horizon: 5 to 15 inches

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4

Texture: Clay loam or loam
Clay content: 20 to 35 percent
Content of rock fragments: 15 to 60 percent—10 to 25 percent cobbles and stones, 5 to 35 percent pebbles or channers
Effervescence: Slight to violent in the lower half
Reaction: pH 6.6 to 9.0

Bk1 and Bk2 horizons
Hue: 10YR or 2.5Y
Value: 6 to 8 dry; 4 to 7 moist
Chroma: 2 to 4
Texture: Clay loam or loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 80 percent—0 to 40 percent cobbles and stones, 25 to 45 percent pebbles or channers
Calcium carbonate equivalent: 40 to 50 percent
Reaction: pH 7.4 to 9.0

122—Whitore gravelly clay loam, 8 to 30 percent slopes

Composition

Whitore and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 5,000 to 6,000 feet
Mean annual precipitation: 20 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Repp, cool, soils
• Soils that have volcanic ash in the surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

123—Whitore gravelly clay loam, 30 to 60 percent slopes

Composition

Whitore and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, northeast aspect
Elevation: 5,000 to 6,000 feet
Mean annual precipitation: 20 to 30 inches
Frost-free period: 40 to 60 days

Component Description

Surface layer texture: Gravelly clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Repp, cool, soils
• Soils that have volcanic ash in the surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

Wildgen Series

The Wildgen series consists of very deep, well drained soils that formed in alpine till. These soils are on moraines and mountains. Slope is 4 to 60 percent. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 18 to 22 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 70 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Udic Ustochrepts

Typical Pedon

Wildgen gravelly loam, 4 to 30 percent slopes, in a forested area, 3,000 feet south and 100 feet west of the northeast corner of sec. 35, T. 16 N., R. 14 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 6 inches; pinkish gray (7.5YR 6/2) gravelly loam, brown (7.5YR 4/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 20 percent pebbles; neutral; clear wavy boundary.

E2—6 to 19 inches; pinkish gray (7.5YR 7/2) gravelly loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 20 percent pebbles; slightly acid; gradual wavy boundary.

E and Bt1—19 to 32 inches; 75 percent pinkish gray (7.5YR 7/2) very gravelly loam, brown (7.5YR 5/4) moist (E part); 25 percent brown (7.5YR 5/4) lamella of very gravelly loam, brown (7.5YR 4/4) moist (Bt part); moderate medium subangular blocky structure; hard, friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; 40 percent pebbles, 5 percent cobbles; slightly acid; gradual wavy boundary.

E and Bt2—32 to 50 inches; 75 percent pinkish gray (7.5YR 7/2) very gravelly loam, brown (7.5YR 5/4) moist (E part); 25 percent brown (7.5YR 5/4) lamellae of very gravelly loam, brown (7.5YR 4/4) moist (Bt part); medium fine and moderate subangular blocky structure; hard, friable, nonsticky and nonplastic; few very fine and fine roots; 40 percent pebbles, 10 percent cobbles; slightly acid; gradual wavy boundary.

C—50 to 60 inches; pinkish gray (7.5YR 7/2) very gravelly loam, brown (7.5YR 5/2) moist; massive; hard, friable, nonsticky and nonplastic; 35 percent pebbles, 10 percent cobbles; slightly acid.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between depths of 4 and 12 inches

E1 horizon

Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 3 or 4 moist
Chroma: 2 to 4
Clay content: 15 to 25 percent
Content of rock fragments: 20 to 50 percent—0 to 15 percent cobbles and stones, 20 to 35 percent pebbles
Reaction: pH 5.6 to 7.3

E2 horizon

Hue: 10YR or 7.5YR
Value: 6 to 8 dry; 4 to 7 moist
Chroma: 1 to 4
Texture: Loam or sandy loam
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles and stones, 20 to 40 percent pebbles
Reaction: pH 5.6 to 7.3

E and Bt horizon

Hue: E part—10YR or 7.5YR; Bt part—10YR or 7.5YR
Value: E part—6 to 8 dry and 5 to 7 moist; Bt part—4 to 7 dry and 3 to 5 moist
Chroma: E part—1 to 4; Bt part—3 to 6
Texture: Loam or sandy loam
Clay content: 10 to 25 percent; less than 3 percent increase in clay in lamellae
Content of rock fragments: 40 to 60 percent—0 to 20 percent cobbles and stones, 35 to 40 percent pebbles
Reaction: pH 5.6 to 7.3

C horizon

Hue: 10YR or 7.5YR
Value: 6 to 8 dry; 4 to 7 moist
Chroma: 1 to 4
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles and stones, 20 to 40 percent pebbles
Reaction: pH 5.6 to 7.3

124—Wildgen gravelly loam, 4 to 30 percent slopes

Composition

Wildgen and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winfall soils on north aspects
- Poorly drained soils
- Soils that have a clayey subsoil
- Soils that have a stony surface layer

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

125—Wildgen-Winkler, cool, gravelly loams, 15 to 30 percent slopes

Composition

Wildgen and similar soils: 60 percent
Winkler and similar soils: 30 percent
Inclusions: 10 percent

Setting

Landform:
- Wildgen—Moraines
- Winkler—Moraines

Slope:
- Wildgen—15 to 30 percent
- Winkler—15 to 30 percent

Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Component Description

Wildgen
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

Winkler
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Winfall soils on north aspects

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

126—Wildgen-Winkler, cool, gravelly loams, 30 to 60 percent slopes

Composition

Wildgen and similar soils: 60 percent
Winkler and similar soils: 30 percent
Inclusions: 10 percent

Setting

Landform:
- Wildgen—Mountains

• Winkler—Mountains
Slope:
• Wildgen—30 to 60 percent
• Winkler—30 to 60 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Component Description

Wildgen
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.2 inches

Winkler
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Winfall soils on north aspects
• Sharrott and similar soils
• Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

127—Wildgen, dry-Winkler complex, 15 to 30 percent slopes

Composition

Wildgen and similar soils: 60 percent
Winkler and similar soils: 30 percent
Inclusions: 10 percent

Setting

Landform:
• Wildgen—Moraines
• Winkler—Moraines
Slope:
• Wildgen—15 to 30 percent
• Winkler—15 to 30 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 18 to 20 inches
Frost-free period: 70 to 90 days

Component Description

Wildgen
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.1 inches

Winkler
Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Wildgen soils on north aspects
• Winkler, cool, soils
• Sharrott and similar soils
• Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

128—Wildgen, dry-Winkler complex, 30 to 60 percent slopes

Composition

Wildgen and similar soils: 60 percent
Winkler and similar soils: 30 percent
Inclusions: 10 percent

Setting

Landform:
• Wildgen—Mountains
• Winkler—Mountains
Slope:
• Wildgen—30 to 60 percent
• Winkler—30 to 60 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 18 to 20 inches
Frost-free period: 70 to 90 days

Component Description

Wildgen
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.1 inches

Winkler
Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Wildgen soils on north aspects
• Winkler, cool, soils
• Sharrott and similar soils
• Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

Winfall Series

The Winfall series consists of very deep, well drained soils that formed in alpine till. These soils are on moraines. Slope is 4 to 30 percent. Elevation is 3,800 to 4,500 feet. The average annual precipitation is 22 to 35 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Dystric Eutrochrepts

Typical Pedon

Winfall gravelly loam, 4 to 30 percent slopes, in a forested area, 1,000 feet north and 1,000 feet west of the southeast corner of sec. 21, T. 19 N., R. 16 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E—0 to 18 inches; pinkish gray (7.5YR 7/2) gravelly loam, brown (7.5YR 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium and few coarse roots; many very fine and fine pores; 25 percent pebbles; strongly acid; gradual smooth boundary.

E and Bt—18 to 60 inches; 80 percent pinkish gray (7.5YR 7/2) very gravelly loam, brown (7.5YR 5/2) moist (E part); 20 percent brown (7.5YR 5/2) lamellae of very fine sandy loam ⅛ to ¼ inch thick, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine and medium roots; few fine pores; 35 percent pebbles, 10 percent cobbles; medium acid.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between depths of 8 and 24 inches
Note: Some pedons have a thin A horizon.

E horizon
Hue: 5YR, 7.5YR, or 10YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 10 to 20 percent
Content of rock fragments: 15 to 60 percent—0 to

10 percent cobbles and stones, 15 to 50 percent pebbles

Reaction: pH 5.1 to 6.5

E and Bt horizon

Hue: E part—5YR, 7.5YR, or 10YR; B part—5YR, 7.5YR, or 10YR

Value: E part—6 or 7 dry and 5 or 6 moist; B part—5 or 6 dry and 4 or 5 moist

Chroma: E part—2 or 3; B part—3 or 4

Texture: Loam, fine sandy loam, or sandy loam

Clay content: 10 to 20 percent; less than 3 percent increase in clay in lamellae

Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles, 35 to 45 percent pebbles

Reaction: pH 5.1 to 6.5

Note: This horizon is hard or very hard when it is dry.

129—Winfall gravelly loam, 4 to 30 percent slopes

Composition

Winfall and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent
Elevation: 3,800 to 4,500 feet
Mean annual precipitation: 22 to 35 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Courville and similar soils
- Poorly drained soils
- Rumblecreek and similar soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Winkler Series

The Winkler series consists of very deep, somewhat excessively drained soils that formed in colluvium derived from argillite and quartzite. These soils are on moraines and mountains. Slope is 8 to 80 percent. Elevation is 3,500 to 5,600 feet. The average annual precipitation is 17 to 30 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed, frigid Udic Ustochrepts

Typical Pedon

Winkler very gravelly sandy loam, 30 to 60 percent slopes, in a forested area, 1,320 feet east and 660 feet south of the northwest corner of sec. 3, T. 13 N., R. 17 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

A—0 to 3 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many fine pores; 40 percent angular pebbles; slightly acid; clear smooth boundary.

E1—3 to 8 inches; pinkish gray (7.5YR 6/2) very gravelly sandy loam, brown (7.5YR 5/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many fine pores; 40 percent angular pebbles; slightly acid; gradual wavy boundary.

E2—8 to 25 inches; pinkish gray (7.5YR 6/2) very gravelly sandy loam, brown (7.5YR 5/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; many fine pores; 45 percent angular pebbles; slightly acid; gradual wavy boundary.

E and Bt—25 to 42 inches; 75 percent pinkish gray (7.5YR 6/2) extremely gravelly sandy loam, brown

(7.5YR 5/2) moist (E part); 25 percent reddish brown (5YR 5/3) lamellae of fine sandy loam ⅛ to ½ inch thick, reddish brown (5YR 4/4) moist (Bt part); weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine and fine pores; 20 percent angular cobbles, 50 percent angular pebbles; medium acid; gradual wavy boundary.

C—42 to 60 inches; pinkish gray (7.5YR 6/2) extremely gravelly sandy loam, brown (7.5YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots and pores; 20 percent angular cobbles, 55 percent angular pebbles; medium acid.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between depths of 8 and 24 inches

A horizon
Hue: 7.5YR or 10YR
Value: 3 or 4 moist
Chroma: 2 or 3
Texture: Sandy loam or loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 60 percent—0 to 5 percent angular cobbles, 15 to 55 percent angular pebbles
Reaction: pH 6.1 to 7.3

E1 horizon
Hue: 7.5YR or 10YR
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 2 to 4
Texture: Sandy loam or loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 60 percent—0 to 5 percent angular cobbles, 15 to 55 percent angular pebbles
Reaction: pH 5.6 to 7.3

E2 horizon
Hue: 2.5Y, 7.5YR, or 10YR
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 2 to 4
Texture: Sandy loam or loam
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 70 percent—0 to 10 percent angular cobbles, 35 to 60 percent angular pebbles
Reaction: pH 5.6 to 7.3

E and Bt horizon
Hue: E part—2.5Y, 7.5YR, or 10YR; B part—2.5Y, 5YR, 7.5YR, or 10YR
Value: E part—6 to 8 dry and 5 to 7 moist; B part—4 to 6 dry and 4 or 5 moist
Chroma: E part—2 to 4; B part—3 or 4
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 5 to 15 percent; less than 5 percent increase in clay in lamellae
Content of rock fragments: 60 to 85 percent—10 to 25 percent angular cobbles, 50 to 60 percent angular pebbles
Reaction: pH 5.6 to 6.5

C horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Sandy loam or fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 85 percent—10 to 25 percent angular cobbles, 50 to 60 percent angular pebbles
Reaction: pH 5.6 to 7.3

130—Winkler very gravelly sandy loam, 8 to 30 percent slopes

Composition

Winkler and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 24 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Bigarm and similar soils

- Bignell and similar soils
- Winkler, cool, soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

131—Winkler very gravelly sandy loam, 30 to 60 percent slopes

Composition

Winkler and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, southwest aspect
Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 24 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bigarm and similar soils
- Repp and similar soils
- Sharrott and similar soils
- Areas of rock outcrop and rubble land
- Winkler, cool, soils
- Cooler, moist soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

132—Winkler gravelly loam, cool, 8 to 30 percent slopes

Composition

Winkler and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 30 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Tevis and similar soils
- Winkler soils on warm aspects
- Soils that have a clayey subsoil

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

133—Winkler gravelly loam, cool, 30 to 60 percent slopes

Composition

Winkler and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Mountains
Slope: 30 to 60 percent, northeast aspect
Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 30 inches
Frost-free period: 70 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Repp, cool, soils
- Tevis and similar soils
- Winkler soils on warm aspects
- Soils that have volcanic ash in the surface layer
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

134—Winkler-Rubble land complex, 50 to 80 percent slopes

Composition

Winkler and similar soils: 45 percent
Rubble land: 40 percent
Inclusions: 15 percent

Setting

Landform:
- Winkler—Mountains
- Rubble land—Mountains

Slope:
- Winkler—50 to 80 percent, southwest aspect
- Rubble land—50 to 80 percent

Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 24 inches
Frost-free period: 70 to 90 days

Component Description

Winkler

Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.1 inches

Rubble land

Definition: Areas in which stones or boulders cover more than 90 percent of the surface

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Repp and similar soils
- Winkler, cool, soils
- Sharrott and similar soils
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

135—Winkler, cool-Rock outcrop complex, 50 to 80 percent slopes

Composition

Winkler and similar soils: 55 percent
Rock outcrop: 25 percent
Inclusions: 20 percent

Setting

Landform:
• Winkler—Mountains
• Rock outcrop—Mountains
Slope:
• Winkler—50 to 80 percent, northeast aspect
• Rock outcrop—50 to 80 percent
Elevation: 3,500 to 5,600 feet
Mean annual precipitation: 17 to 30 inches
Frost-free period: 70 to 90 days

Component Description

Winkler
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.0 inches

Rock outcrop
Definition: Exposures of argillite or quartzite bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Mitten and similar soils
• Repp, cool, soils
• Tevis and similar soils
• Winkler soils on warm aspects
• Soils that are shallow over bedrock
• Areas of rubble land

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

• Range section
• Forest land section
• Agronomy section
• Recreation section
• Wildlife habitat section
• Engineering and soil properties sections

Xerofluvents

Xerofluvents consist of very deep, somewhat poorly drained to well drained soils that formed in alluvium. These soils are on flood plains. Slope is 0 to 2 percent. Elevation is 2,900 to 3,200 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 44 to 46 degrees F, and the frost-free season is 90 to 110 days.

Typical Pedon

Xerofluvents in an area of pasture, 1,200 feet south and 900 feet west of the northeast corner of sec. 4, T. 14 N., R. 21 W.

0 to 3 inches; light brownish gray (10YR 6/2) sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; neutral; clear wavy boundary.

3 to 13 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; neutral; gradual wavy boundary.

13 to 60 inches; light gray (10YR 7/2) very gravelly loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; neutral.

Range in Characteristics

Surface texture: Loamy very fine sand to loam
Subsurface texture: Loam to extremely gravelly sand

136—Xerofluvents, 0 to 2 percent slopes

Composition

Xerofluvents and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 2,900 to 3,200 feet
Mean annual precipitation: 11 to 14 inches
Frost-free period: 90 to 110 days

Component Description

Depth class: Very deep (more than 60 inches)
Dominant parent material: Alluvium
Flooding: Frequent
Note: The properties of these soils are highly variable.

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

• Moiese and similar soils

- Areas of riverwash
- Poorly drained soils

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

Yourame Series

The Yourame series consists of very deep, well drained soils that formed in alpine till. These soils are on moraines. Slope is 4 to 30 percent. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 17 to 23 inches, the average annual air temperature is 40 to 44 degrees F, and the frost-free season is 60 to 90 days.

Taxonomic Class: Loamy-skeletal, mixed Typic Eutroboralfs

Typical Pedon

Yourame gravelly loam, 4 to 30 percent slopes, in a forested area, 360 feet south of the east quarter corner of sec. 1, T. 15 N., R. 14 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

E1—0 to 4 inches; light brownish gray (10YR 6/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 15 percent pebbles; slightly acid; abrupt wavy boundary.

E2—4 to 11 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; strong medium and coarse granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 15 percent pebbles; neutral; clear smooth boundary.

E/Bt—11 to 21 inches; 80 percent pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist (E part); 20 percent light yellowish brown (10YR 6/4) gravelly loam, yellowish brown (10YR 5/4) moist (Bt part); moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; few thin clay films on faces of peds; 20 percent pebbles; neutral; clear smooth boundary.

Bt—21 to 48 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; common very fine, fine, and medium roots; common moderately thick clay films on faces of peds; 10 percent cobbles, 40 percent pebbles; neutral; abrupt smooth boundary.

Bk—48 to 60 inches; very pale brown (10YR 7/3) very gravelly clay loam, brown (10YR 5/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; 15 percent cobbles, 40 percent pebbles; disseminated lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Depth to Bk horizon: 35 to 60 inches

E1 horizon
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 or 3
Clay content: 7 to 20 percent
Content of rock fragments: 15 to 35 percent—5 to 15 percent cobbles and stones, 15 to 35 percent pebbles
Reaction: pH 5.6 to 7.3

E2 horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 7 to 20 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles and stones, 15 to 25 percent pebbles
Reaction: pH 5.6 to 7.3

E/Bt horizon
Hue: E part—10YR or 7.5YR; Bt part—10YR or 7.5YR
Value: E part—6 or 7 dry and 5 or 6 moist; Bt part—5 or 6 dry and 4 or 5 moist
Chroma: E part—2 or 3; Bt part—2 to 4
Texture: Loam or sandy loam
Clay content, mixed: 7 to 25 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles and stones, 15 to 25 percent pebbles
Reaction: pH 5.6 to 7.3

Bt horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay loam or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles and stones, 30 to 40 percent pebbles

Reaction: pH 5.6 to 7.3

Bk horizon
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 2 or 3
Texture: Clay loam or loam
Clay content: 18 to 30 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles and stones, 30 to 40 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

137—Yourame gravelly loam, 4 to 30 percent slopes

Composition

Yourame and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Moraines
Slope: 4 to 30 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 17 to 23 inches
Frost-free period: 60 to 90 days

Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till
Native plant cover type: Forest land
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Rumblecreek and similar soils
- Poorly drained soils
- Wildgen and similar soils
- Soils that are shallow over bedrock
- Areas of rock outcrop

Management

For general and detailed information concerning managing the unit, see Part II of this publication:

- Range section
- Forest land section
- Agronomy section
- Recreation section
- Wildlife habitat section
- Engineering and soil properties sections

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hill slopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillite. Weakly metamorphosed mudstone or shale.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hill slopes. Back slopes in profile are commonly steep and linear and descend to a foot slope. In terms of gradational process, back slopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board one foot wide, one foot long, and one inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep or very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, a felled tree generally is reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation by use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Cirque. A semicircular, concave, bowllike area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from adjacent stands.

Climax plant community. The plant community on a

given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forest land capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion; in areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that

part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit the use of a full stripcropping pattern.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low

hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A term used to identify a generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is more often applied to cliffs resulting from differential erosion.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between the individuals. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. A firebreak also serves as a line from which to work and to facilitate the movement of fire fighters and

equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothills. A region of relatively low, rounded hills at the base of a mountain range.

Foot slope. The geomorphic component that forms the inner, gently inclined surface at the base of a hill slope. The surface profile is dominantly concave. In terms of gradational processes, a foot slope is a transition zone between an upslope site of erosion (back slope) and a downslope site of deposition (toe slope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. A gullied map unit is one that has numerous gullies.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that

increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and are less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low-residue crops. Crops such as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of the tree.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of limited summit area and generally having steep sides (slopes greater than 25 percent) and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are primarily formed by deep-seated earth movements or volcanic action and secondarily by differential erosion.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed

organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors

responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	less than 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata mainly red in color and composed largely of sandstone and shale.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently

rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transition zone from the back slope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine-textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks,

prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are: *platy* (laminated), *prismatic (vertical axis of aggregates longer than horizontal), columnar* (prisms with

rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances. It commonly is a massive arcuate ridge or complex of ridges underlain by till and other types of drift.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill. Toe slopes are commonly gentle and linear in profile.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Waterspreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

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United States Department of Agriculture,
Natural Resources Conservation Service
and Forest Service

In cooperation with
United States Department of the Interior,
Bureau of Indian Affairs and
Bureau of Land Management, and
Montana Agricultural Experiment Station

Soil Survey of Missoula County Area, Montana

Part II

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, which is the color map preceding the detailed soil maps, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your general area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

The **detailed soil maps** follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** in Part I of this survey, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

A **State Soil Geographic Data Base (STATSGO)** is available for this survey area. This data base consists of a soils map at a scale of 1 to 250,000 and descriptions of groups of associated soils. It replaces the general soil map published in older soil surveys. The map and the data base can be used for multicounty planning, and map output can be tailored for a specific use. More information about the State Soil Geographic Data Base for this survey area, or any portion of Montana, is available at the local office of the Natural Resources Conservation Service.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service and Forest Service; the United States Department of the Interior, Bureau of Land Management and Bureau of Indian Affairs; and the Montana Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Missoula County Conservation District. Financial assistance was provided by the Forest Service, the Champion International Corporation, and the Missoula County Commissioners in cooperation with the Missoula County Conservation District, the Bureau of Land Management, the Montana Department of State Lands, and the Burlington Northern Corporation.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Contents

Part I

Index to taxonomic units iv
Index to map units v
Summary of tables ix
Foreword xi
How this survey was made 1
General nature of the survey area 2
History 2
Transportation facilities 3
Drainage and physiography 3
General geology and geologic formation 4
Climate 4
General soil map units 9
Map unit descriptions 9
Formation and classification of the soils 15
Soil series and detailed soil map units 23
References 135
Glossary 137

Part II

Detailed soil map unit legend v
Summary of tables viii
Agronomy 7
Cropland limitations and hazards 7
Crop yield estimates 8
Land capability classification 9
Prime farmland and other important farmland 10
Erosion factors 11
Windbreaks and environmental plantings 11
Range 39
Range condition 40
Rangeland management 40
Forest land understory vegetation 41
Forest land 71
Woodland ordination system 72
Forest land management and productivity 73
Recreation 103
Wildlife habitat 119
Elements of wildlife habitat 119
Kinds of wildlife habitat 119
Wildlife in the Missoula County area 120
Engineering 123
Building site development 123
Sanitary facilities 124
Waste management 125
Construction materials 126
Water management 127
Soil properties 185
Engineering index properties 185
Physical and chemical properties 186
Water features 188
Soil features 189
References 285
Glossary 287

Issued November 1995

Detailed Soil Map Unit Legend

1—Alberton very fine sandy loam, 0 to 2 percent slopes
2—Ambrant gravelly sandy loam, 15 to 30 percent slopes
3—Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes
4—Aquic Haploxerolls, 0 to 2 percent slopes
5—Aquic Udorthents, 0 to 2 percent slopes
6—Aquolls and Aquepts, 0 to 2 percent slopes
7—Argixerolls-Haploxerolls complex, 0 to 4 percent slopes
8—Argixerolls-Haploxerolls complex, 4 to 15 percent slopes
9—Argixerolls-Haploxerolls complex, 15 to 30 percent slopes
10—Argixerolls-Haploxerolls complex, 30 to 60 percent slopes
11—Auggie silt loam, 4 to 15 percent slopes
12—Bata gravelly silt loam, cool, 2 to 8 percent slopes
13—Bata-Waldbillig gravelly silt loams, 4 to 30 percent slopes
14—Beeskove gravelly loam, 30 to 60 percent slopes
15—Beeskove-Rock outcrop complex, 50 to 80 percent slopes
16—Bigarm gravelly loam, 0 to 4 percent slopes
17—Bigarm gravelly loam, 4 to 15 percent slopes
18—Bigarm gravelly loam, 15 to 30 percent slopes
19—Bigarm gravelly loam, 30 to 60 percent slopes
20—Bigarm-Rock outcrop complex, 30 to 60 percent slopes
21—Biglake gravelly sandy loam, 8 to 15 percent slopes
22—Biglake gravelly sandy loam, 15 to 30 percent slopes
23—Bignell gravelly loam, 8 to 30 percent slopes
24—Bignell-Winkler, cool, complex, 30 to 60 percent slopes
25—Bignell, warm-Winkler complex, 30 to 60 percent slopes
26—Borohemists, 0 to 2 percent slopes
27—Chickaman silt loam, 8 to 30 percent slopes
28—Chickaman silt loam, 30 to 60 percent slopes
29—Coerock-Rock outcrop complex, 4 to 30 percent slopes
30—Coerock-Rock outcrop complex, 50 to 80 percent slopes
31—Courville gravelly silt loam, 8 to 30 percent slopes
32—Courville-Mitten gravelly silt loams, 30 to 60 percent slopes
33—Crow silt loam, 4 to 15 percent slopes
34—Desmet loam, 0 to 2 percent slopes
35—Elkner-Ovando complex, 8 to 30 percent slopes
36—Evaro gravelly loam, 8 to 30 percent slopes
37—Evaro gravelly loam, 30 to 60 percent slopes
38—Felan gravelly silt loam, 8 to 30 percent slopes
39—Felan gravelly silt loam, 30 to 60 percent slopes
40—Felan gravelly silt loam, cool, 8 to 30 percent slopes
41—Felan gravelly silt loam, cool, 30 to 60 percent slopes
42—Glaciercreek gravelly silt loam, 0 to 4 percent slopes
43—Glaciercreek variant-Glaciercreek complex, 4 to 20 percent slopes
44—Grantsdale loam, 0 to 2 percent slopes
45—Grassvalley silty clay loam, 0 to 4 percent slopes
46—Grassvalley silty clay loam, 4 to 8 percent slopes
47—Grassvalley silty clay loam, 8 to 15 percent slopes
48—Grassvalley silty clay loam, 15 to 30 percent slopes
49—Greenough silt loam, 4 to 15 percent slopes
50—Hagstadt silt loam, 4 to 25 percent slopes
51—Half Moon silt loam, 4 to 8 percent slopes
52—Hanaker silt loam, 0 to 6 percent slopes
53—Hollandlake gravelly loam, 4 to 30 percent slopes
54—Hollandlake-Bata complex, 4 to 30 percent slopes
55—Hollandlake-Bata complex, 30 to 60 percent slopes
56—Holloway gravelly silt loam, 8 to 30 percent slopes
57—Holloway gravelly silt loam, 30 to 60 percent slopes

58—Holloway gravelly silt loam, cool, 8 to 30 percent slopes
59—Holloway gravelly silt loam, cool, 30 to 60 percent slopes
60—Holloway-Rock outcrop complex, 50 to 80 percent slopes
61—Jimlake gravelly silt loam, 4 to 30 percent slopes
62—Jimlake gravelly silt loam, 30 to 60 percent slopes
63—Lantern gravelly sandy loam, 8 to 30 percent slopes
64—Lantern gravelly sandy loam, 30 to 60 percent slopes
65—Lantern-Rock outcrop complex, 50 to 80 percent slopes
66—Lolopeak bouldery loam, 50 to 80 percent slopes
67—Lolopeak-Rock outcrop complex, 50 to 80 percent slopes
68—Lubrecht silt loam, 4 to 15 percent slopes
69—Mitten gravelly silt loam, 30 to 60 percent slopes
70—Mitten-Sharrott, cool, complex, 15 to 40 percent slopes
71—Mitten-Tevis complex, 30 to 60 percent slopes
72—Moiese gravelly loam, 0 to 2 percent slopes
73—Orthents, 0 to 4 percent slopes
74—Ovando-Elkner-Rock outcrop complex, 30 to 60 percent slopes
75—Perma gravelly loam, 0 to 4 percent slopes
76—Perma gravelly loam, 20 to 45 percent slopes
77—Perma stony loam, 2 to 12 percent slopes
78—Perma variant stony silt loam, 2 to 8 percent slopes
79—Perma variant-Perma complex, 4 to 30 percent slopes
80—Petty gravelly loam, 8 to 30 percent slopes
81—Petty gravelly loam, 30 to 60 percent slopes
82—Petty bouldery loam, 30 to 60 percent slopes
83—Petty gravelly loam, cool, 8 to 30 percent slopes
84—Petty bouldery loam, cool, 50 to 80 percent slopes
85—Petty, cool-Rock outcrop complex, 50 to 80 percent slopes
86—Phillcher silt loam, 4 to 30 percent slopes
87—Phillcher-Rock outcrop complex, 50 to 80 percent slopes
88—Pits, gravel
89—Repp very gravelly loam, 30 to 60 percent slopes
90—Repp very gravelly loam, cool, 8 to 30 percent slopes
91—Repp very gravelly loam, cool, 30 to 60 percent slopes
92—Repp-Rock outcrop complex, 50 to 80 percent slopes
93—Riverwash
94—Rock outcrop-Rubble land complex
95—Rumblecreek gravelly loam, 4 to 30 percent slopes
96—Selway gravelly sandy loam, 8 to 30 percent slopes
97—Selway gravelly sandy loam, 30 to 60 percent slopes
98—Selway bouldery sandy loam, 30 to 60 percent slopes
99—Sharrott-Rock outcrop complex, 4 to 30 percent slopes
100—Shooflin silt loam, 4 to 15 percent slopes
101—Tally variant sandy loam, 0 to 4 percent slopes
102—Tevis gravelly loam, 30 to 60 percent slopes
103—Tevis-Mitten complex, 8 to 30 percent slopes
104—Tevis-Mitten-Rock outcrop complex, 45 to 70 percent slopes
105—Totelake gravelly loam, 2 to 8 percent slopes
106—Totelake gravelly loam, 8 to 30 percent slopes
107—Totelake extremely stony loam, 2 to 8 percent slopes
108—Trapps gravelly loam, 8 to 30 percent slopes
109—Trapps gravelly loam, 30 to 60 percent slopes
110—Turrah silty clay loam, 0 to 2 percent slopes
111—Udifluvents, 0 to 2 percent slopes
112—Udorthents-Glaciercreek complex, 0 to 8 percent slopes

113—Upsata gravelly fine sandy loam, 2 to 8 percent slopes
114—Urban land
115—Waldbillig gravelly silt loam, 4 to 30 percent slopes
116—Waldbillig gravelly silt loam, 30 to 60 percent slopes
117—Waldbillig-Auggie complex, 4 to 15 percent slopes
118—Waldbillig-Holloway gravelly silt loams, 8 to 30 percent slopes
119—Waldbillig-Holloway gravelly silt loams, 30 to 60 percent slopes
120—Waldbillig-Holloway gravelly silt loams, cool, 8 to 30 percent slopes
121—Waldbillig-Holloway gravelly silt loams, cool, 30 to 60 percent slopes
W—Water
122—Whitore gravelly clay loam, 8 to 30 percent slopes
123—Whitore gravelly clay loam, 30 to 60 percent slopes
124—Wildgen gravelly loam, 4 to 30 percent slopes
125—Wildgen-Winkler, cool, gravelly loams, 15 to 30 percent slopes
126—Wildgen-Winkler, cool, gravelly loams, 30 to 60 percent slopes
127—Wildgen, dry-Winkler complex, 15 to 30 percent slopes
128—Wildgen, dry-Winkler complex, 30 to 60 percent slopes
129—Winfall gravelly loam, 4 to 30 percent slopes
130—Winkler very gravelly sandy loam, 8 to 30 percent slopes
131—Winkler very gravelly sandy loam, 30 to 60 percent slopes
132—Winkler gravelly loam, cool, 8 to 30 percent slopes
133—Winkler gravelly loam, cool, 30 to 60 percent slopes
134—Winkler-Rubble land complex, 50 to 80 percent slopes
135—Winkler, cool-Rock outcrop complex, 50 to 80 percent slopes
136—Xerofluvents, 0 to 2 percent slopes
137—Yourame gravelly loam, 4 to 30 percent slopes

Summary of Tables

Part I

Temperature and precipitation 5

Freeze dates in spring and fall 7

Growing season 8

Classification of the soils 18

Acreage and proportionate extent of the soils 20

Part II

Classification of the soils 2

Acreage and proportionate extent of the soils. 4

Main cropland limitations and hazards 13

Land capability and yields per acre of crops and pasture 29

Prime farmland. 38

Rangeland productivity and characteristic plant communities. 42

Understory vegetation and habitat types 44

Forest land management. 75

Forest land productivity 82

Main forest access road limitations and hazards 93

Recreational development. 105

Building site development 128

Sanitary facilities 141

Construction materials 156

Water management... 171

Engineering index properties 190

Physical properties of the soils 236

Chemical properties of the soils.................................. 251

Water features 266

Soil features 275

Soil Survey of
Missoula County Area, Montana

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The classification and extent of the soils in this survey area are shown in the tables "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," which are at the end of this section.

CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alberton	Coarse-loamy, mixed, frigid Aridic Haploxerolls
Ambrant	Coarse-loamy, mixed, frigid Udic Ustochrepts
Aquic Haploxerolls	Aquic Haploxerolls
Aquic Udorthents	Aquic Udorthents
Aquepts	Aquepts
Aquolls	Aquolls
Argixerolls	Argixerolls
Auggie	Fine-silty, mixed Typic Cryoboralfs
Bata	Loamy-skeletal, mixed Andeptic Cryoboralfs
Beeskove	Loamy-skeletal, mixed, frigid Typic Eutrochrepts
Bigarm	Loamy-skeletal, mixed, frigid Typic Haploxerolls
Biglake	Sandy-skeletal, mixed, frigid Typic Haploxerolls
Bignell	Clayey-skeletal, mixed Typic Eutroboralfs
Borohemists	Borohemists
Chickaman	Coarse-silty, micaceous Andic Cryochrepts
Coerock	Medial-skeletal Lithic Cryandepts
Courville	Loamy-skeletal, mixed, frigid Andic Dystric Eutrochrepts
Crow	Fine, mixed Typic Eutroboralfs
Desmet	Coarse-silty, mixed, frigid Calciorthidic Haploxerolls
Elkner	Coarse-loamy, mixed Typic Cryochrepts
Evaro	Loamy-skeletal, mixed Typic Cryochrepts
Felan	Loamy-skeletal, mixed Andic Cryochrepts
Glaciercreek	Sandy-skeletal, mixed, frigid Andic Dystric Eutrochrepts
Glaciercreek variant	Coarse-loamy, mixed, frigid Dystric Eutrochrepts
Grantsdale	Coarse-silty over sandy or sandy-skeletal, mixed, frigid Calciorthidic Haploxerolls
Grassvalley	Fine, illitic, frigid Typic Haploxeralfs
Greenough	Fine-silty, mixed Typic Eutroboralfs
Hagstadt	Fine-silty, mixed, frigid Udic Ustochrepts
Half Moon	Fine-silty, mixed Typic Eutroboralfs
Hanaker	Fine-silty, mixed Typic Argiborolls
Haploxerolls	Haploxerolls
Hollandlake	Loamy-skeletal, mixed Typic Cryoboralfs
Holloway	Loamy-skeletal, mixed Andic Cryochrepts
Jimlake	Loamy-skeletal, mixed Andeptic Cryoboralfs
Lantern	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts
Lolopeak	Sandy-skeletal, mixed Andic Cryumbrepts
Lubrecht	Fine, mixed Typic Eutroboralfs
Mitten	Loamy-skeletal, mixed, frigid Andic Dystric Eutrochrepts
Moiese	Sandy-skeletal, mixed, frigid Calciorthidic Haploxerolls
Orthents	Orthents
Ovando	Sandy-skeletal, mixed Typic Cryorthents
Perma	Loamy-skeletal, mixed Typic Haploborolls
Perma variant	Loamy-skeletal, mixed Typic Argiborolls
Petty	Loamy-skeletal, mixed Andic Cryochrepts
Phillcher	Loamy-skeletal, mixed Andic Cryochrepts
Repp	Loamy-skeletal, mixed, frigid Typic Ustochrepts
Rochester	Sandy-skeletal, mixed, frigid Typic Ustorthents
Rumblecreek	Loamy-skeletal, mixed Typic Eutroboralfs
Selway	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts
Sharrott	Loamy-skeletal, mixed, frigid Lithic Ustochrepts
Shooflin	Very fine, montmorillonitic Typic Eutroboralfs
Tally variant	Sandy, mixed Typic Haploborolls
Tevis	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts
Totelake	Sandy-skeletal, mixed, frigid Udic Ustochrepts
Trapps	Loamy-skeletal, mixed Typic Eutroboralfs
Turrah	Fine, mixed, frigid Cumulic Haplaquolls
Udifluvents	Udifluvents
Udorthents	Udorthents
Upsata	Sandy-skeletal, mixed Andic Cryochrepts
Waldbillig	Loamy-skeletal, mixed Andic Cryochrepts
Whitore	Loamy-skeletal, carbonatic Typic Cryochrepts
Wildgen	Loamy-skeletal, mixed, frigid Udic Ustochrepts
Winfall	Loamy-skeletal, mixed, frigid Dystric Eutrochrepts

CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Winkler	Loamy-skeletal, mixed, frigid Udic Ustochrepts
Xerofluvents	Xerofluvents
Yourame	Loamy-skeletal, mixed Typic Eutroboralfs

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Alberton very fine sandy loam, 0 to 2 percent slopes	4,900	0.4
2	Ambrant gravelly sandy loam, 15 to 30 percent slopes	3,230	0.3
3	Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes	3,210	0.3
4	Aquic Haploxerolls, 0 to 2 percent slopes	1,670	0.1
5	Aquic Udorthents, 0 to 2 percent slopes	1,480	0.1
6	Aquolls and Aquepts, 0 to 2 percent slopes	11,020	0.9
7	Argixerolls-Haploxerolls complex, 0 to 4 percent slopes	4,280	0.3
8	Argixerolls-Haploxerolls complex, 4 to 15 percent slopes	13,070	1.0
9	Argixerolls-Haploxerolls complex, 15 to 30 percent slopes	8,290	0.7
10	Argixerolls-Haploxerolls complex, 30 to 60 percent slopes	1,750	0.1
11	Auggie silt loam, 4 to 15 percent slopes	3,960	0.3
12	Bata gravelly silt loam, cool, 2 to 8 percent slopes	980	*
13	Bata-Waldbillig gravelly silt loams, 4 to 30 percent slopes	13,980	1.1
14	Beeskove gravelly loam, 30 to 60 percent slopes	14,660	1.1
15	Beeskove-Rock outcrop complex, 50 to 80 percent slopes	1,870	0.1
16	Bigarm gravelly loam, 0 to 4 percent slopes	9,980	0.8
17	Bigarm gravelly loam, 4 to 15 percent slopes	2,760	0.2
18	Bigarm gravelly loam, 15 to 30 percent slopes	7,360	0.6
19	Bigarm gravelly loam, 30 to 60 percent slopes	18,760	1.5
20	Bigarm-Rock outcrop complex, 30 to 60 percent slopes	5,400	0.4
21	Biglake gravelly sandy loam, 8 to 15 percent slopes	330	*
22	Biglake gravelly sandy loam, 15 to 30 percent slopes	1,710	0.1
23	Bignell gravelly loam, 8 to 30 percent slopes	22,110	1.7
24	Bignell-Winkler, cool, complex, 30 to 60 percent slopes	2,760	0.2
25	Bignell, warm-Winkler complex, 30 to 60 percent slopes	3,120	0.2
26	Borohemists, 0 to 2 percent slopes	1,430	0.1
27	Chickaman silt loam, 8 to 30 percent slopes	180	*
28	Chickaman silt loam, 30 to 60 percent slopes	6,480	0.5
29	Coerock-Rock outcrop complex, 4 to 30 percent slopes	6,130	0.5
30	Coerock-Rock outcrop complex, 50 to 80 percent slopes	7,610	0.6
31	Courville gravelly silt loam, 8 to 30 percent slopes	2,610	0.2
32	Courville-Mitten gravelly silt loams, 30 to 60 percent slopes	1,950	0.2
33	Crow silt loam, 4 to 15 percent slopes	8,250	0.7
34	Desmet loam, 0 to 2 percent slopes	4,700	0.4
35	Elkner-Ovando complex, 8 to 30 percent slopes	1,640	0.1
36	Evaro gravelly loam, 8 to 30 percent slopes	7,110	0.6
37	Evaro gravelly loam, 30 to 60 percent slopes	12,600	1.0
38	Felan gravelly silt loam, 8 to 30 percent slopes	6,280	0.5
39	Felan gravelly silt loam, 30 to 60 percent slopes	24,960	2.0
40	Felan gravelly silt loam, cool, 8 to 30 percent slopes	2,550	0.2
41	Felan gravelly silt loam, cool, 30 to 60 percent slopes	6,450	0.5
42	Glaciercreek gravelly silt loam, 0 to 4 percent slopes	7,200	0.6
43	Glaciercreek variant-Glaciercreek complex, 4 to 20 percent slopes	3,110	0.2
44	Grantsdale loam, 0 to 2 percent slopes	7,260	0.6
45	Grassvalley silty clay loam, 0 to 4 percent slopes	5,190	0.4
46	Grassvalley silty clay loam, 4 to 8 percent slopes	2,460	0.2
47	Grassvalley silty clay loam, 8 to 15 percent slopes	2,550	0.2
48	Grassvalley silty clay loam, 15 to 30 percent slopes	1,760	0.1
49	Greenough silt loam, 4 to 15 percent slopes	3,550	0.3
50	Hagstadt silt loam, 4 to 25 percent slopes	1,820	0.1
51	Half Moon silt loam, 4 to 8 percent slopes	3,490	0.3
52	Hanaker silt loam, 0 to 6 percent slopes	3,700	0.3
53	Hollandlake gravelly loam, 4 to 30 percent slopes	6,250	0.5
54	Hollandlake-Bata complex, 4 to 30 percent slopes	19,410	1.5
55	Hollandlake-Bata complex, 30 to 60 percent slopes	5,070	0.4
56	Holloway gravelly silt loam, 8 to 30 percent slopes	11,560	0.9
57	Holloway gravelly silt loam, 30 to 60 percent slopes	62,540	4.9
58	Holloway gravelly silt loam, cool, 8 to 30 percent slopes	5,350	0.4
59	Holloway gravelly silt loam, cool, 30 to 60 percent slopes	3,260	0.3
60	Holloway-Rock outcrop complex, 50 to 80 percent slopes	20,380	1.6
61	Jimlake gravelly silt loam, 4 to 30 percent slopes	22,790	1.8

* See footnote at end of table.

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
62	Jimlake gravelly silt loam, 30 to 60 percent slopes	3,810	0.3
63	Lantern gravelly sandy loam, 8 to 30 percent slopes	470	*
64	Lantern gravelly sandy loam, 30 to 60 percent slopes	4,230	0.3
65	Lantern-Rock outcrop complex, 50 to 80 percent slopes	1,300	0.1
66	Lolopeak bouldery loam, 50 to 80 percent slopes	3,580	0.3
67	Lolopeak-Rock outcrop complex, 50 to 80 percent slopes	3,900	0.3
68	Lubrecht silt loam, 4 to 15 percent slopes	3,300	0.3
69	Mitten gravelly silt loam, 30 to 60 percent slopes	2,960	0.2
70	Mitten-Sharrott, cool, complex, 15 to 40 percent slopes	2,580	0.2
71	Mitten-Tevis complex, 30 to 60 percent slopes	35,060	2.7
72	Moiese gravelly loam, 0 to 2 percent slopes	8,170	0.6
73	Orthents, 0 to 4 percent slopes	3,170	0.2
74	Ovando-Elkner-Rock outcrop complex, 30 to 60 percent slopes	5,440	0.4
75	Perma gravelly loam, 0 to 4 percent slopes	8,550	0.7
76	Perma gravelly loam, 20 to 45 percent slopes	1,980	0.2
77	Perma stony loam, 2 to 12 percent slopes	1,430	0.1
78	Perma variant stony silt loam, 2 to 8 percent slopes	840	*
79	Perma variant-Perma complex, 4 to 30 percent slopes	2,060	0.2
80	Petty gravelly loam, 8 to 30 percent slopes	4,960	0.4
81	Petty gravelly loam, 30 to 60 percent slopes	17,210	1.3
82	Petty bouldery loam, 30 to 60 percent slopes	6,650	0.5
83	Petty gravelly loam, cool, 8 to 30 percent slopes	7,960	0.6
84	Petty bouldery loam, cool, 50 to 80 percent slopes	2,610	0.2
85	Petty, cool-Rock outcrop complex, 50 to 80 percent slopes	2,340	0.2
86	Phillcher silt loam, 4 to 30 percent slopes	3,040	0.2
87	Phillcher-Rock outcrop complex, 50 to 80 percent slopes	6,270	0.5
88	Pits, gravel	780	*
89	Repp very gravelly loam, 30 to 60 percent slopes	19,330	1.5
90	Repp very gravelly loam, cool, 8 to 30 percent slopes	4,060	0.3
91	Repp very gravelly loam, cool, 30 to 60 percent slopes	22,080	1.7
92	Repp-Rock outcrop complex, 50 to 80 percent slopes	1,760	0.1
93	Riverwash	1,600	0.1
94	Rock outcrop-Rubble land complex	24,300	1.9
95	Rumblecreek gravelly loam, 4 to 30 percent slopes	13,310	1.0
96	Selway gravelly sandy loam, 8 to 30 percent slopes	1,380	0.1
97	Selway gravelly sandy loam, 30 to 60 percent slopes	3,440	0.3
98	Selway bouldery sandy loam, 30 to 60 percent slopes	2,810	0.2
99	Sharrott-Rock outcrop complex, 4 to 30 percent slopes	2,270	0.2
100	Shooflin silt loam, 4 to 15 percent slopes	6,640	0.5
101	Tally variant sandy loam, 0 to 4 percent slopes	1,100	*
102	Tevis gravelly loam, 30 to 60 percent slopes	28,200	2.2
103	Tevis-Mitten complex, 8 to 30 percent slopes	5,500	0.4
104	Tevis-Mitten-Rock outcrop complex, 45 to 70 percent slopes	3,590	0.3
105	Totelake gravelly loam, 2 to 8 percent slopes	10,210	0.8
106	Totelake gravelly loam, 8 to 30 percent slopes	2,620	0.2
107	Totelake extremely stony loam, 2 to 8 percent slopes	2,130	0.2
108	Trapps gravelly loam, 8 to 30 percent slopes	1,360	0.1
109	Trapps gravelly loam, 30 to 60 percent slopes	10,880	0.8
110	Turrah silty clay loam, 0 to 2 percent slopes	3,480	0.3
111	Udifluvents, 0 to 2 percent slopes	5,160	0.4
112	Udorthents-Glaciercreek complex, 0 to 8 percent slopes	2,110	0.2
113	Upsata gravelly fine sandy loam, 2 to 8 percent slopes	6,810	0.5
114	Urban land	6,230	0.5
115	Waldbillig gravelly silt loam, 4 to 30 percent slopes	42,690	3.3
116	Waldbillig gravelly silt loam, 30 to 60 percent slopes	1,370	0.1
117	Waldbillig-Auggie complex, 4 to 15 percent slopes	5,580	0.4
118	Waldbillig-Holloway gravelly silt loams, 8 to 30 percent slopes	29,050	2.3
119	Waldbillig-Holloway gravelly silt loams, 30 to 60 percent slopes	49,430	3.9
120	Waldbillig-Holloway gravelly silt loams, cool, 8 to 30 percent slopes	15,730	1.2
121	Waldbillig-Holloway gravelly silt loams, cool, 30 to 60 percent slopes	3,710	0.3
122	Whitore gravelly clay loam, 8 to 30 percent slopes	2,300	0.2

* See footnote at end of table.

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
123	Whitore gravelly clay loam, 30 to 60 percent slopes	2,220	0.2
124	Wildgen gravelly loam, 4 to 30 percent slopes	12,240	1.0
125	Wildgen-Winkler, cool, gravelly loams, 15 to 30 percent slopes	8,150	0.6
126	Wildgen-Winkler, cool, gravelly loams, 30 to 60 percent slopes	4,580	0.4
127	Wildgen, dry-Winkler complex, 15 to 30 percent slopes	2,440	0.2
128	Wildgen, dry-Winkler complex, 30 to 60 percent slopes	3,670	0.3
129	Winfall gravelly loam, 4 to 30 percent slopes	12,800	1.0
130	Winkler very gravelly sandy loam, 8 to 30 percent slopes	15,080	1.2
131	Winkler very gravelly sandy loam, 30 to 60 percent slopes	88,090	6.9
132	Winkler gravelly loam, cool, 8 to 30 percent slopes	21,120	1.6
133	Winkler gravelly loam, cool, 30 to 60 percent slopes	99,070	7.7
134	Winkler-Rubble land complex, 50 to 80 percent slopes	8,230	0.6
135	Winkler, cool-Rock outcrop complex, 50 to 80 percent slopes	12,150	0.9
136	Xerofluvents, 0 to 2 percent slopes	15,250	1.2
137	Yourame gravelly loam, 4 to 30 percent slopes	4,270	0.3
W	Water	23,000	1.8
	Total	1,281,500	100.0

* Less than 0.1 percent. The combined extent of the soils assigned an asterisk in the percent column is about 0.4 percent of the survey area.

Agronomy

General management needed for crops and for hay and pasture is suggested in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed soil map units in the survey area for crops are shown in the table "Main Cropland Limitations and Hazards." The main concerns in managing nonirrigated cropland are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water infiltration rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion*. Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *channels, flooding, depth to rock, ponding, gullies,* and *lack of timely precipitation*.

Additional limitations and hazards are as follows:

Areas of rock outcrop and slick spots.—Farming around these areas may be feasible. Subsoiling or deep ripping soft sedimentary beds increases the effective rooting depth and the rate of water infiltration.

Excessive permeability.—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

Potential for ground-water pollution.—This is a hazard in soils with excessive permeability, hard bedrock, or a water table within the profile.

Lime content, limited available water capacity, poor tilth, restricted permeability, and *surface crusting.*—These limitations can be overcome by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer to soils that have a high content of lime.

Short frost-free season.—If the growing season is less than 90 days, short-season crops or grasses should be grown.

Surface coarse fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Slope.—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

Surface stones.—Stones or boulders on the surface can hinder normal tillage unless they are removed.

Salt and sodium content.—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

On irrigated soils the main management concerns are *efficient water use, nutrient management, control of erosion, pest and weed control,* and *timely planting and harvesting* for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can

create drainage problems, raise the water table, and increase soil salinity.

Following is an explanation of the criteria used to determine the limitations or hazards.

Areas of rock outcrop.—Rock outcrop is a named component of the map unit.

Areas of rubble land.—Rubble land is a named component of the map unit.

Areas of slick spots.—Slick spots are a named component of the map unit.

Channeled.—The word "channeled" is included in the name of the map unit.

Depth to rock.—Bedrock is within a depth of 40 inches.

Erosion by water.—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Excessive permeability.—The upper limit of the permeability range is 6 inches or more within the soil profile.

Flooding.—The component of the map unit is occasionally flooded or frequently flooded.

Gullied.—The word "gullied" is included in the name of the map unit.

Lack of timely precipitation.—The component of the map unit has a Xeric moisture regime. The amount of annual precipitation is no more than 14 inches.

Lime content.—The component is assigned to wind erodibility group 4L or has more than 5 percent lime in the upper 10 inches.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 5 inches or less.

Ponding.—Ponding duration is assigned to the component of the map unit.

Potential for ground-water pollution.—The soil has a water table within a depth of 4 feet or hard bedrock within the profile, or permeability is more than 6 inches per hour within the soil.

Poor tilth.—The component of the map unit has more than 35 percent clay in the surface layer.

Restricted permeability.—Permeability is 0.06 inches per hour or less within the soil profile.

Salt content.—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

Short frost-free season.—The map unit has a growing season of less than 90 frost-free days.

Slope.—The upper slope range of the component of the map unit is more than 8 percent.

Sodium content.—The sodium adsorption ratio of the component of the map unit is more than 13 within a depth of 30 inches.

Soil blowing.—The wind erodibility index multiplied by the selected high C factor for the survey area and then divided by the T factor is more than 8 for the component of the map unit.

Surface rock fragments.—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery, and "surface stones" is not already indicated as a limitation.

Surface crusting.—The sodium adsorption ratio in the surface layer is 5 or more for any texture and 4 or more if the texture is silt, silt loam, loam, or very fine sandy loam.

Surface stones.—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the soil is a stony or bouldery phase.

Water table.—The component of the map unit has a water table within a depth of 60 inches.

Crop Yield Estimates

The average yields per acre that can be expected of the principal crops under a high level of management are shown in the table "Land Capability and Yields per Acre of Crops and Pasture." In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss. Yields for dryland crops are based on a crop-fallow system.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared

with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Pasture and Hayland Interpretations

Soils are assigned to pasture and hayland groups according to their suitability for the production of forage. The soils in each group are similar enough to be suited to the same species of grasses or legumes, have similar limitations and hazards, require similar management, and have similar productivity levels and other responses to management.

Under good management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

Yield estimates are often provided in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about forage yields other than those shown in the table "Land Capability and Yields per Acre of Crops and Pasture."

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, as described in "Land Capability Classification" *(13)*, soils generally are grouped at three levels—capability class, subclass, and unit. These levels indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grain, cotton, hay, and field-grown vegetables. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.

If properly managed, soils in classes 1, 2, 3, and 4 are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class 1 to class 4. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes 5, 6, and 7 are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class 5 to class 7. The local office of the Cooperative Extension Service can provide guidance on the use of these soils as cropland.

Areas in class 8 are generally not suitable for crops, pasture, or woodland without a level of management that is impractical. These areas may have potential for other uses, such as recreational facilities and wildlife habitat.

Capability subclasses indicate the dominant limitations in the class. They are designated by adding a small letter, *E, W, S,* or *C*, to the class numeral, for example, 3E. The letter *E* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *W* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *S* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *C*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class 1 because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *W, S,* or *C* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the table "Land Capability and Yields per Acre of Crops and Pasture" at the end of this section.

Prime Farmland and Other Important Farmland

In this section, prime farmland and other important farmland are defined. The soils in the survey area that are considered prime farmland are listed in the table "Prime Farmland" at the end of this section.

Prime Farmland

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland where these limitations are overcome by drainage measures, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 26,500 acres, or nearly 2 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The map units in the survey area that meet the requirements for prime farmland are listed in the table "Prime Farmland." On the soils included in the table, measures that overcome limitations are needed. The need for these measures is indicated in parentheses after the map unit name. The location of each map unit is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described in the section "Soil Series and Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Unique Farmland

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil qualities, location, growing season, and moisture supply needed for the economic production of sustained high yields of a specific high-quality crop when treated and managed by acceptable farming methods. Examples of such crops are citrus, tree nuts, olives, cranberries, and vegetables.

Unique farmland is used for a specific high-value food or fiber crop; has an adequate supply of available moisture for the specific crop because of stored moisture, precipitation, or irrigation; and has a combination of soil qualities, growing season, temperature, humidity, air drainage, elevation, aspect, and other factors, such as nearness to markets, that favors the production of a specific food or fiber crop.

Lists of unique farmland are developed as needed in cooperation with conservation districts and others.

Additional Farmland of Statewide Importance

Some areas other than areas of prime and unique farmland are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas are determined by the appropriate State agency or agencies. Generally, additional farmland of statewide

importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed by acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable. In some states additional farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

A list of this land has not been maintained for Montana and thus is not presently available.

Additional Farmland of Local Importance

This land consists of areas that are of local importance in the production of food, feed, fiber, forage, and oilseed crops and are not identified as having national or statewide importance. Where appropriate, this land is identified by local agencies. It may include tracts of land that have been designated for agriculture by local ordinance.

Lists of this land are developed as needed in cooperation with conservation districts and others.

Erosion Factors

Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices.

Soil Erodibility (K) Factor

The soil erodibility factor (K) indicates the susceptibility of a soil to sheet and rill erosion by water. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties are the content of silt plus very fine sand, the content of sand coarser than very fine sand, the content of organic matter, soil structure, and permeability.

Fragment-Free Soil Erodibility (Kf) Factor

This is one of the factors used in the revised Universal Soil Loss Equation. It shows the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Soil-Loss Tolerance (T) Factor

The soil-loss tolerance factor (T) is an estimate of the maximum annual rate of soil erosion that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gullying, and the value of nutrients lost through erosion.

Wind Erodibility Groups

Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. From this percentage, the wind erodibility index factor (I) is determined. This factor is an expression of the stability of the soil aggregates, or the extent to which they are broken down by tillage and the abrasion caused by windblown soil particles. Soils are assigned to wind erodibility groups (WEG) having similar percentages of dry soil aggregates larger than 0.84 millimeter.

Additional information about wind erodibility groups and K, Kf, T, and I factors can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and have survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the

characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under a given climate. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

Information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a nursery.

MAIN CROPLAND LIMITATIONS AND HAZARDS

(See text for a description of the limitations and hazards listed in this table)

Map symbol and soil name	Cropland limitations or hazards
1:	
Alberton	Excessive permeability Lack of timely precipitation Potential for ground-water pollution
2:	
Ambrant	Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope
3:	
Ambrant	Areas of rock outcrop Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope
Rochester	Areas of rock outcrop Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Soil blowing
Rock outcrop	Nonsoil material
4:	
Aquic Haploxerolls	Onsite investigation required
5:	
Aquic Udorthents	Onsite investigation required
6:	
Aquolls	Onsite investigation required
Aquepts	Onsite investigation required
7:	
Argixerolls	Onsite investigation required
Haploxerolls	Onsite investigation required
8:	
Argixerolls	Onsite investigation required
Haploxerolls	Onsite investigation required
9:	
Argixerolls	Onsite investigation required

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
10:	
Argixerolls	Onsite investigation required
Haploxerolls	Onsite investigation required
11:	
Auggie	Erosion by water Short frost-free period Slope
12:	
Bata	Short frost-free period
13:	
Bata	Erosion by water Short frost-free period Slope
Waldbillig	Erosion by water Short frost-free period Slope
14:	
Beeskove	Erosion by water Limited available water capacity Short frost-free period Slope
15:	
Beeskove	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope
Rock outcrop	Nonsoil material
16:	
Bigarm	None
17:	
Bigarm	Erosion by water Slope
18:	
Bigarm	Erosion by water Slope
19:	
Bigarm	Erosion by water Slope
20:	
Bigarm	Areas of rock outcrop Erosion by water Slope
Rock outcrop	Nonsoil material

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
21:	
Biglake	Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Slope Soil blowing
22:	
Biglake	Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Slope Soil blowing
23:	
Bignell	Erosion by water Short frost-free period Slope
24:	
Bignell	Erosion by water Short frost-free period Slope
Winkler	Limited available water capacity Short frost-free period Slope Surface rock fragments
25:	
Bignell	Erosion by water Short frost-free period Slope
Winkler	Limited available water capacity Short frost-free period Slope Surface rock fragments
26:	
Borohemists	Onsite investigation required
27:	
Chickaman	Erosion by water Short frost-free period Slope
28:	
Chickaman	Erosion by water Short frost-free period Slope
29:	
Coerock	Areas of rock outcrop Depth to rock Erosion by water Limited available water capacity Potential for ground-water pollution Short frost-free period

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
29:	
Rock outcrop	Nonsoil material
30:	
Coerock	Areas of rock outcrop Depth to rock Erosion by water Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Soil blowing Surface rock fragments
Rock outcrop	Nonsoil material
31:	
Courville	Erosion by water Short frost-free period Slope
32:	
Courville	Erosion by water Short frost-free period Slope
Mitten	Erosion by water Limited available water capacity Short frost-free period Slope
33:	
Crow	Erosion by water Short frost-free period Slope
34:	
Desmet	Lack of timely precipitation
35:	
Elkner	Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope
Ovando	Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Soil blowing
36:	
Evaro	Erosion by water Limited available water capacity Short frost-free period Slope

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
37:	
Evaro	Erosion by water Limited available water capacity Short frost-free period Slope
38:	
Felan	Erosion by water Short frost-free period Slope
39:	
Felan	Erosion by water Short frost-free period Slope
40:	
Felan	Erosion by water Short frost-free period Slope
41:	
Felan	Erosion by water Short frost-free period Slope
42:	
Glaciercreek	Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period
43:	
Glaciercreek variant	Erosion by water Short frost-free period Slope
Glaciercreek	Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope
44:	
Grantsdale	Excessive permeability Lack of timely precipitation Potential for ground-water pollution
45:	
Grassvalley	Lack of timely precipitation Poor tilth Restricted permeability
46:	
Grassvalley	Erosion by water Lack of timely precipitation Poor tilth Restricted permeability

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
47:	
Grassvalley	Erosion by water Lack of timely precipitation Poor tilth Restricted permeability Slope
48:	
Grassvalley	Erosion by water Lack of timely precipitation Poor tilth Restricted permeability Slope
49:	
Greenough	Erosion by water Short frost-free period Slope
50:	
Hagstadt	Depth to rock Erosion by water Limited available water capacity Short frost-free period Slope
51:	
Half Moon	Erosion by water Short frost-free period
52:	
Hanaker	Erosion by water Short frost-free period
53:	
Hollandlake	Erosion by water Short frost-free period Slope
54:	
Hollandlake	Erosion by water Short frost-free period Slope
Bata	Erosion by water Short frost-free period Slope
55:	
Hollandlake	Erosion by water Short frost-free period Slope
Bata	Erosion by water Short frost-free period Slope
56:	
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
57:	
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope
58:	
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope
59:	
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope
60:	
Holloway	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope
Rock outcrop	Nonsoil material
61:	
Jimlake	Erosion by water Short frost-free period Slope
62:	
Jimlake	Erosion by water Short frost-free period Slope
63:	
Lantern	Erosion by water Limited available water capacity Short frost-free period Slope
64:	
Lantern	Erosion by water Limited available water capacity Short frost-free period Slope
65:	
Lantern	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope
Rock outcrop	Nonsoil material

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
66:	
Lolopeak	Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Surface stones
67:	
Lolopeak	Areas of rock outcrop Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Surface stones
Rock outcrop	Nonsoil material
68:	
Lubrecht	Depth to rock Erosion by water Short frost-free period Slope
69:	
Mitten	Erosion by water Limited available water capacity Short frost-free period Slope
70:	
Mitten	Erosion by water Limited available water capacity Short frost-free period Slope
Sharrott	Depth to rock Erosion by water Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Soil blowing
71:	
Mitten	Erosion by water Limited available water capacity Short frost-free period Slope
Tevis	Erosion by water Limited available water capacity Short frost-free period Slope
72:	
Moiese	Excessive permeability Lack of timely precipitation Limited available water capacity Potential for ground-water pollution

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
73:	
Orthents	Onsite investigation required
74:	
Ovando	Areas of rock outcrop Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Soil blowing
Elkner	Areas of rock outcrop Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope
Rock outcrop	Nonsoil material
75:	
Perma	Limited available water capacity Short frost-free period
76:	
Perma	Erosion by water Limited available water capacity Short frost-free period Slope
77:	
Perma	Erosion by water Limited available water capacity Short frost-free period Slope Surface stones
78:	
Perma variant	Short frost-free period Surface stones
79:	
Perma variant	Erosion by water Short frost-free period Slope Surface stones
Perma	Erosion by water Limited available water capacity Short frost-free period Slope Surface stones
80:	
Petty	Erosion by water Limited available water capacity Short frost-free period Slope

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
81:	
Petty	Erosion by water Limited available water capacity Short frost-free period Slope
82:	
Petty	Erosion by water Limited available water capacity Short frost-free period Slope Surface stones
83:	
Petty	Erosion by water Limited available water capacity Short frost-free period Slope
84:	
Petty	Erosion by water Limited available water capacity Short frost-free period Slope Surface stones
85:	
Petty	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope Surface stones
Rock outcrop	Nonsoil material
86:	
Phillcher	Erosion by water Limited available water capacity Short frost-free period Slope
87:	
Phillcher	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope
Rock outcrop	Nonsoil material
88:	
Pits	Nonsoil material
89:	
Repp	Erosion by water Limited available water capacity Short frost-free period Slope Surface rock fragments

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
90:	
Repp	Lime content Limited available water capacity Short frost-free period Slope Surface rock fragments
91:	
Repp	Erosion by water Lime content Limited available water capacity Short frost-free period Slope Surface rock fragments
92:	
Repp	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope Surface rock fragments
Rock outcrop	Nonsoil material
93:	
Riverwash	Nonsoil material
94:	
Rock outcrop	Nonsoil material
Rubble land	Nonsoil material
95:	
Rumblecreek	Erosion by water Short frost-free period Slope
96:	
Selway	Erosion by water Limited available water capacity Short frost-free period Slope
97:	
Selway	Erosion by water Limited available water capacity Short frost-free period Slope
98:	
Selway	Erosion by water Limited available water capacity Short frost-free period Slope Surface stones

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
99:	
Sharrott	Areas of rock outcrop Depth to rock Erosion by water Limited available water capacity Potential for ground-water pollution Short frost-free period Slope Soil blowing
Rock outcrop	Nonsoil material
100:	
Shooflin	Erosion by water Restricted permeability Short frost-free period Slope
101:	
Tally variant	Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period
102:	
Tevis	Erosion by water Limited available water capacity Short frost-free period Slope
103:	
Tevis	Erosion by water Limited available water capacity Short frost-free period Slope
Mitten	Erosion by water Limited available water capacity Short frost-free period Slope
104:	
Tevis	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope
Mitten	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope
Rock outcrop	Nonsoil material
105:	
Totelake	Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
106:	
Totelake	Erosion by water Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Slope
107:	
Totelake	Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Surface stones
108:	
Trapps	Erosion by water Limited available water capacity Short frost-free period Slope
109:	
Trapps	Erosion by water Limited available water capacity Short frost-free period Slope
110:	
Turrah	Poor tilth Potential for ground-water pollution Short frost-free period Water table
111:	
Udifluvents	Onsite investigation required
112:	
Udorthents	Onsite investigation required
Glaciercreek	Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period
113:	
Upsata	Excessive permeability Limited available water capacity Potential for ground-water pollution Short frost-free period Soil blowing
114:	
Urban land	Nonsoil material
115:	
Waldbillig	Erosion by water Short frost-free period Slope
116:	
Waldbillig	Erosion by water Short frost-free period Slope

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
117:	
Waldbillig	Erosion by water Short frost-free period Slope
Auggie	Erosion by water Short frost-free period Slope
118:	
Waldbillig	Erosion by water Short frost-free period Slope
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope
119:	
Waldbillig	Erosion by water Short frost-free period Slope
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope
120:	
Waldbillig	Erosion by water Short frost-free period Slope
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope
121:	
Waldbillig	Erosion by water Short frost-free period Slope
Holloway	Erosion by water Limited available water capacity Short frost-free period Slope
122:	
Whitore	Erosion by water Lime content Limited available water capacity Short frost-free period Slope
123:	
Whitore	Erosion by water Lime content Limited available water capacity Short frost-free period Slope

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
124:	
Wildgen	Erosion by water Short frost-free period Slope
125:	
Wildgen	Erosion by water Short frost-free period Slope
Winkler	Erosion by water Limited available water capacity Short frost-free period Slope
126:	
Wildgen	Erosion by water Short frost-free period Slope
Winkler	Erosion by water Limited available water capacity Short frost-free period Slope
127:	
Wildgen	Erosion by water Short frost-free period Slope
Winkler	Limited available water capacity Short frost-free period Slope Surface rock fragments
128:	
Wildgen	Erosion by water Short frost-free period Slope
Winkler	Limited available water capacity Short frost-free period Slope Surface rock fragments
129:	
Winfall	Erosion by water Short frost-free period Slope
130:	
Winkler	Limited available water capacity Short frost-free period Slope Surface rock fragments
131:	
Winkler	Limited available water capacity Short frost-free period Slope Surface rock fragments

MAIN CROPLAND LIMITATIONS AND HAZARDS--Continued

Map symbol and soil name	Cropland limitations or hazards
132:	
Winkler	Erosion by water Limited available water capacity Short frost-free period Slope
133:	
Winkler	Erosion by water Limited available water capacity Short frost-free period Slope
134:	
Winkler	Areas of rubble land Limited available water capacity Short frost-free period Slope Surface rock fragments
Rubble land	Nonsoil material
135:	
Winkler	Areas of rock outcrop Erosion by water Limited available water capacity Short frost-free period Slope
Rock outcrop	Nonsoil material
136:	
Xerofluvents	Onsite investigation required
137:	
Yourame	Erosion by water Short frost-free period Slope
W:	
Water	Nonsoil material

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. The listing of a crop yield does not endorse the use of a soil for that crop)

Map symbol and soil name	Land capability N	Land capability I	Winter wheat N	Winter wheat I	Barley N	Barley I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Grass-legume hay N	Grass-legume hay I	Pasture N	Pasture I
			Bu		Bu		Tons		Tons		Tons		AUM*	
1:														
Alberton	3C	3C	37.0	---	53.0	60.0	---	5.5	1.0	---	---	---	---	9.0
2:														
Ambrant	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
3:														
Ambrant	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rochester	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
4:														
Aquic Haploxerolls.														
5:														
Aquic Udorthents.														
6:														
Aquolls.														
Aquepts.														
7:														
Argixerolls.														
Haploxerolls.														
8:														
Argixerolls.														
Haploxerolls.														
9:														
Argixerolls.														
Haploxerolls.														
10:														
Argixerolls.														
Haploxerolls.														
11:														
Auggie	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
12:														
Bata	6E	---	---	---	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability		Winter wheat		Barley		Alfalfa hay		Grass hay		Grass-legume hay		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I	N	I
			Bu		Bu		Tons		Tons		Tons		AUM*	
13:														
Bata----------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Waldbillig----	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
14:														
Beeskove------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
15:														
Beeskove------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
16:														
Bigarm--------	4E	3E	29.0	---	45.0	---	---	---	1.5	4.0	---	---	1.8	7.0
17:														
Bigarm--------	4E	4E	27.0	---	41.0	---	---	---	1.2	3.5	---	---	1.5	6.0
18:														
Bigarm--------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
19:														
Bigarm--------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
20:														
Bigarm--------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
21:														
Biglake-------	6E	---	16.0	---	27.0	---	---	---	---	---	---	---	---	---
22:														
Biglake-------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
23:														
Bignell-------	6E	---	5.0	---	11.0	---	---	---	---	---	---	---	---	---
24:														
Bignell-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Winkler-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
25:														
Bignell-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Winkler-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
26:														
Borohemists.														
27:														
Chickaman-----	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
28:														
Chickaman-----	7E	---	---	---	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability		Winter wheat		Barley		Alfalfa hay		Grass hay		Grass-legume hay		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I	N	I
			Bu		Bu		Tons		Tons		Tons		AUM*	
29:														
Coerock	7S	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
30:														
Coerock	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
31:														
Courville	6E	---	17.0	---	27.0	---	---	---	---	---	---	---	---	---
32:														
Courville	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Mitten	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
33:														
Crow	6E	---	28.0	---	42.0	---	---	---	---	---	---	---	---	---
34:														
Desmet	3C	2C	35.0	---	45.0	55.0	---	---	1.0	---	1.0	5.5	1.0	9.0
35:														
Elkner	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Ovando	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
36:														
Evaro	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
37:														
Evaro	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
38:														
Felan	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
39:														
Felan	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
40:														
Felan	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
41:														
Felan	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
42:														
Glaciercreek	6S	---	17.0	---	27.0	---	---	---	---	---	---	---	---	---
43:														
Glaciercreek variant	6E	---	28.0	---	42.0	---	---	---	---	---	---	---	---	---
Glaciercreek	6E	---	15.0	---	24.0	---	---	---	---	---	---	---	---	---
44:														
Grantsdale	3C	2C	37.0	---	45.0	55.0	---	---	1.0	---	1.0	5.5	1.0	9.0

* See footnote at end of table.

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability		Winter wheat		Barley		Alfalfa hay		Grass hay		Grass-legume hay		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I	N	I
			Bu		Bu		Tons		Tons		Tons		AUM*	
45:														
Grassvalley---	4S	4S	35.0	---	40.0	65.0	---	---	---	---	1.5	5.5	---	---
46:														
Grassvalley---	4E	4E	35.0	---	40.0	60.0	---	---	---	---	1.5	4.5	---	---
47:														
Grassvalley---	4E	---	35.0	---	52.0	---	---	---	---	---	1.3	---	---	---
48:														
Grassvalley---	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
49:														
Greenough-----	6E	---	37.0	---	52.0	---	---	---	---	---	---	---	---	---
50:														
Hagstadt------	6E	---	9.0	---	17.0	---	---	---	---	---	---	---	---	---
51:														
Half Moon-----	6E	---	38.0	---	53.0	---	---	---	---	---	---	---	---	---
52:														
Hanaker-------	6E	6E	40.0	---	50.0	70.0	3.5	5.0	---	---	---	---	---	---
53:														
Hollandlake---	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
54:														
Hollandlake---	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Bata----------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
55:														
Hollandlake---	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Bata----------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
56:														
Holloway------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
57:														
Holloway------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
58:														
Holloway------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
59:														
Holloway------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
60:														
Holloway------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
61:														
Jimlake-------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
62:														
Jimlake-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability N	Land capability I	Winter wheat N	Winter wheat I	Barley N	Barley I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Grass-legume hay N	Grass-legume hay I	Pasture N	Pasture I
			Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons	Tons	Tons	AUM*	AUM*
63:														
Lantern--------	6E	---	16.0	---	25.0	---	---	---	---	---	---	---	---	---
64:														
Lantern--------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
65:														
Lantern--------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
66:														
Lolopeak-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
67:														
Lolopeak-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
68:														
Lubrecht-------	6E	---	27.0	---	40.0	---	---	---	---	---	---	---	---	---
69:														
Mitten---------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
70:														
Mitten---------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Sharrott-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
71:														
Mitten---------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Tevis----------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
72:														
Moiese---------	6S	4S	20.0	---	31.0	---	---	---	---	---	---	4.5	0.5	6.0
73:														
Orthents.														
74:														
Ovando---------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Elkner---------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
75:														
Perma----------	6S	---	27.0	---	41.0	---	---	---	---	---	---	---	---	---
76:														
Perma----------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
77:														
Perma----------	6S	---	23.0	---	36.0	---	---	---	---	---	---	---	---	---
78:														
Perma variant-	6S	---	34.0	---	50.0	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability		Winter wheat		Barley		Alfalfa hay		Grass hay		Grass-legume hay		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I	N	I
			Bu		Bu		Tons		Tons		Tons		AUM*	
79:														
Perma variant	6S	---	17.0	---	29.0	---	---	---	---	---	---	---	---	---
Perma	6S	---	10.0	---	19.0	---	---	---	---	---	---	---	---	---
80:														
Petty	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
81:														
Petty	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
82:														
Petty	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
83:														
Petty	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
84:														
Petty	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
85:														
Petty	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
86:														
Phillcher	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
87:														
Phillcher	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
88:														
Pits.														
89:														
Repp	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
90:														
Repp	6E	---	6.0	---	13.0	---	---	---	---	---	---	---	---	---
91:														
Repp	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
92:														
Repp	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
93:														
Riverwash.														
94:														
Rock outcrop.														
Rubble land.														

* See footnote at end of table.

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability N	Land capability I	Winter wheat N	Winter wheat I	Barley N	Barley I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Grass-legume hay N	Grass-legume hay I	Pasture N	Pasture I
			Bu		Bu		Tons		Tons		Tons		AUM*	
95:														
Rumblecreek	6E	---	16.0	---	26.0	---	---	---	---	---	---	---	---	---
96:														
Selway	6E	---	9.0	---	18.0	---	---	---	---	---	---	---	---	---
97:														
Selway	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
98:														
Selway	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
99:														
Sharrott	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
100:														
Shooflin	6E	---	30.0	---	42.0	---	---	---	---	---	---	---	---	---
101:														
Tally variant	6S	---	29.0	---	44.0	---	---	---	---	---	---	---	---	---
102:														
Tevis	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
103:														
Tevis	6E	---	6.0	---	13.0	---	---	---	---	---	---	---	---	---
Mitten	6E	---	9.0	---	17.0	---	---	---	---	---	---	---	---	---
104:														
Tevis	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Mitten	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
105:														
Totelake	6S	---	15.0	---	25.0	---	---	---	---	---	---	---	1.0	---
106:														
Totelake	6E	---	4.0	---	10.0	---	---	---	---	---	---	---	---	---
107:														
Totelake	7S	---	---	---	---	---	---	---	---	---	---	---	---	---
108:														
Trapps	6E	---	10.0	---	18.0	---	---	---	---	---	---	---	---	---
109:														
Trapps	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
110:														
Turrah	5W	---	---	---	---	---	---	---	---	---	---	---	---	---
111:														
Udifluvents.														

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability N	Land capability I	Winter wheat N	Winter wheat I	Barley N	Barley I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Grass-legume hay N	Grass-legume hay I	Pasture N	Pasture I
			Bu		Bu		Tons		Tons		Tons		AUM*	
112:														
Udorthents.														
Glaciercreek--	6S	---	17.0	---	27.0	---	---	---	---	---	---	---	---	---
113:														
Upsata--------	6S	---	---	---	---	---	---	---	---	---	---	---	---	---
114:														
Urban land.														
115:														
Waldbillig----	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
116:														
Waldbillig----	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
117:														
Waldbillig----	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Auggie--------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
118:														
Waldbillig----	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Holloway------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
119:														
Waldbillig----	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Holloway------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
120:														
Waldbillig----	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Holloway------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
121:														
Waldbillig----	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Holloway------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
122:														
Whitore-------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
123:														
Whitore-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
124:														
Wildgen-------	6E	---	11.0	---	20.0	---	---	---	---	---	---	---	---	---
125:														
Wildgen-------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Winkler-------	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
126:														
Wildgen-------	7E	---	---	---	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability		Winter wheat		Barley		Alfalfa hay		Grass hay		Grass-legume hay		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I	N	I
			Bu		Bu		Tons		Tons		Tons		AUM*	
126:														
Winkler	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
127:														
Wildgen	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
Winkler	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
128:														
Wildgen	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Winkler	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
129:														
Winfall	6E	---	17.0	---	27.0	---	---	---	---	---	---	---	---	---
130:														
Winkler	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
131:														
Winkler	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
132:														
Winkler	6E	---	---	---	---	---	---	---	---	---	---	---	---	---
133:														
Winkler	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
134:														
Winkler	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rubble land.														
135:														
Winkler	7E	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop.														
136:														
Xerofluvents.														
137:														
Yourame	6E	---	10.0	---	19.0	---	---	---	---	---	---	---	---	---
W:														
Water.														

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

PRIME FARMLAND

(Only the soils considered primed farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
1	Alberton very fine sandy loam, 0 to 2 percent slopes (where irrigated)
16	Bigarm gravelly loam, 0 to 4 percent slopes (where irrigated)
34	Desmet loam, 0 to 2 percent slopes (where irrigated)
44	Grantsdale loam, 0 to 2 percent slopes (where irrigated)

Range

Approximately 6 percent of the survey area supports rangeland vegetation, and about 24 percent supports woodland understory vegetation that is suitable for livestock grazing. Nearly 75 percent of the farm income in the survey area is derived from the sale of livestock, principally cattle. Cow-calf operations are the major type of livestock enterprise, but some are cow-calf yearling operations. A few units have dairy operations or include sheep or hog production. The average size of the ranches is about 735 acres.

Most grazing is on native range. The range is used primarily for grazing by domestic livestock; however, it also is used as wildlife habitat, recreational areas, or watershed and has esthetic value.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on range are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Range is defined as land on which the native vegetation (the climax, or natural potential, plant community) is predominantly grasses, grasslike plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and certain shrub and forb communities. Range receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

Grazed forest land is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

Native pasture is defined as land on which the potential (climax) vegetation is forest but which is used and managed primarily for the production of native forage plants. Native pasture includes cutover forest land and forest land that has been cleared and is managed for native or naturalized forage plants.

The table "Rangeland Productivity and Characteristic Plant Communities" at the end of this section shows, for each listed soil, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as rangeland or are suited to use as rangeland are listed. Explanation of the column headings in this table follows.

Range site is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants.

Many different range sites are in the survey area. Over time, the combination of plants best suited to a particular soil and climate has become established. If the soil is not excessively disturbed, this group of plants is the natural plant community for the site. Natural plant communities are not static but vary slightly from year to year and place to place.

The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important. The "Field Office Technical Guide," which is available at local offices of the Natural Resources Conservation Service, can provide specific information about range sites.

Total production is the amount of vegetation that can be expected to grow annually on well managed range that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation consists of the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil. The plants are listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range Condition

Range condition is based on a comparison of the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the natural community, the better the range condition.

Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and plowing. Grazing animals select the most palatable plants. These plants will eventually die if they are continually grazed. A very severe disturbance can completely destroy the natural community. Under these conditions, the less desirable plants, such as annuals and weedlike plants, can invade. If the plant community has not deteriorated significantly, it eventually can return to dominantly natural plants if proper grazing management is applied.

Four range condition classes are used to show the degree of deterioration of the natural plant community.

An area of rangeland is in *excellent condition* if more than 75 percent of the present plant community is the same as the natural plant community. It is in *good condition* if the natural plants make up 51 to 75 percent of the present plant community, in *fair condition* if those plants make up 26 to 50 percent, and in *poor condition* if they make up less than 25 percent.

Knowledge of the range site and condition is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses. Such information is needed to determine management objectives, proper grazing systems and stocking rates, suitable wildlife management practices, the potential for recreational uses, and the condition of watersheds.

Rangeland Management

Rangeland management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, reduction of less desirable species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Grazing management is the most important part of any rangeland management program. Proper grazing use, timely deferment of grazing, and planned rotation grazing systems are key practices. The experience of ranchers and research have shown that if no more than one-half of the current year's growth is grazed, a plant community in good or excellent condition can be maintained and one in fair condition can be improved. The remaining one-half enables plants to make and store food for regrowth and root development. As a result, the desirable plants remain healthy and are not replaced by less desirable grasses and weeds. Also, the plant cover protects the soil from water erosion and soil blowing, improves tilth, increases the rate of water infiltration, and helps to control runoff.

Certain practices commonly are needed to obtain a uniform distribution of grazing. These include developing livestock watering facilities, fencing, properly locating salt and mineral supplements, constructing livestock trails in steeply sloping areas, and riding or herding.

Various kinds of grazing systems can be used in range management. No single grazing system is best under all conditions. The grazing system should increase the quantity and improve the quality of the range vegetation, should meet the needs of the individual operator, and should be designed according to the topography, the type of grazing animals, and the resource management objectives.

Special improvement practices are needed in areas where management practices do not achieve the desired results or where recovery is too slow under forage management alone. These include range seeding, brush management, water spreading, prescribed burning, and mechanical treatment.

Some soils are suited to mechanical treatment for range improvement. On other soils, however, only proper grazing management can improve the range.

Many soils in capability classes 1 through 4 are suited to such practices as seeding, mechanical brush and weed control, and water spreading. Those in capability classes 7 and 8, however, are not suitable. Many soils in capability classes 1 through 4 are suited to tillage for seedbed preparation before native or introduced forage plant species are seeded. Soils in capability class 6 may be suited to limited surface disturbance, such as scarification, for the purpose of seeding and as a means of increasing the rate of water infiltration for seed germination.

Where feasible, mechanical renovation practices, such as shallow chiseling, can help to speed recovery of the desired plants. These practices open up the surface and thus allow the absorption of more moisture and production of the more desirable plants. Mechanical renovation, brush management, and timely deferment of grazing allow recovery of the desired plants.

Seeding may be needed in areas where the less desirable plants are dominant. A clean, firm seedbed should be prepared, suitable species should be selected for seeding, and rest periods should be long enough to allow the new plants to become established.

Special improvement practices can be effective only if the management system helps to keep the desirable plants healthy.

Forest Land Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some forest land can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

The table "Understory Vegetation and Habitat Types" at the end of this section shows, for each soil suitable for forest land, the potential for producing understory vegetation. The *total production* of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimal part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

The table also lists the common names of the *characteristic vegetation* on each soil and the *composition*, by percentage of air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of forest land in which the production of wood crops is highest. The *representative habitat type or phase* displayed in this table is documented in the "Forest Habitat Types of Montana" habitat types system *(12)*.

RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

(Only the soils that support rangeland vegetation suitable for grazing are listed. Ppt means precipitation)

Map symbol and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
17:					
Bigarm	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	2,000	Bluebunch wheatgrass	45
		Normal	1,500	Rough fescue	25
		Unfavorable	1,100	Idaho fescue	5
				Arrowleaf balsamroot	5
				Lupine	5
				Columbia needlegrass	5
				Prairie junegrass	3
				Sandberg bluegrass	2
18:					
Bigarm	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,700	Bluebunch wheatgrass	60
		Normal	1,300	Rough fescue	10
		Unfavorable	900	Idaho fescue	5
				Arrowleaf balsamroot	5
				Prairie junegrass	3
				Other shrubs	3
				Lupine	3
				Sandberg bluegrass	2
19:					
Bigarm	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,700	Bluebunch wheatgrass	60
		Normal	1,300	Rough fescue	10
		Unfavorable	900	Idaho fescue	5
				Arrowleaf balsamroot	5
				Prairie junegrass	3
				Other shrubs	3
				Lupine	3
				Sandberg bluegrass	2
20:					
Bigarm	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,700	Bluebunch wheatgrass	60
		Normal	1,300	Rough fescue	10
		Unfavorable	900	Idaho fescue	5
				Arrowleaf balsamroot	5
				Prairie junegrass	3
				Other shrubs	3
				Lupine	3
				Sandberg bluegrass	2
Rock outcrop.					
21:					
Biglake	Shallow to gravel, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	2,000	Bluebunch wheatgrass	50
		Normal	1,600	Idaho fescue	5
		Unfavorable	1,300	Rough fescue	5
				Sandberg bluegrass	5
				Prairie junegrass	5
				Lupine	5
22:					
Biglake	Shallow to gravel, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	2,000	Bluebunch wheatgrass	50
		Normal	1,600	Idaho fescue	5
		Unfavorable	1,300	Rough fescue	5
				Sandberg bluegrass	5
				Prairie junegrass	5
				Lupine	5

RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
47:					
Grassvalley	Silty, 10- to 14-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,200	Bluebunch wheatgrass	90
		Normal	1,000	Other perennial forbs	5
		Unfavorable	700	Prairie junegrass	2
				Sandberg bluegrass	1
48:					
Grassvalley	Silty, 10- to 14-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,200	Bluebunch wheatgrass	90
		Normal	1,000	Other perennial forbs	5
		Unfavorable	700	Prairie junegrass	2
				Sandberg bluegrass	1
75:					
Perma	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,800	Rough fescue	50
		Normal	1,500	Bluebunch wheatgrass	20
		Unfavorable	1,100	Other perennial grasses	10
				Other perennial forbs	10
				Idaho fescue	5
				Other shrubs	3
76:					
Perma	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,800	Rough fescue	50
		Normal	1,500	Bluebunch wheatgrass	20
		Unfavorable	1,100	Other perennial grasses	10
				Other perennial forbs	10
				Idaho fescue	5
				Other shrubs	3
77:					
Perma	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,800	Rough fescue	50
		Normal	1,500	Bluebunch wheatgrass	20
		Unfavorable	1,100	Other perennial grasses	10
				Other perennial forbs	10
				Idaho fescue	5
				Other shrubs	3
78:					
Perma variant	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	2,000	Rough fescue	50
		Normal	1,600	Bluebunch wheatgrass	20
		Unfavorable	1,100	Other perennial grasses	10
				Other perennial forbs	10
				Idaho fescue	5
				Other shrubs	3
79:					
Perma variant	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	2,000	Rough fescue	50
		Normal	1,600	Bluebunch wheatgrass	20
		Unfavorable	1,100	Other perennial grasses	10
				Other perennial forbs	10
				Idaho fescue	5
				Other shrubs	3
Perma	Silty, 15- to 19-inch Ppt zone, Northern Rocky Mountain valleys, West	Favorable	1,800	Rough fescue	50
		Normal	1,500	Bluebunch wheatgrass	20
		Unfavorable	1,100	Other perennial grasses	10
				Other perennial forbs	10
				Idaho fescue	5
				Other shrubs	3

UNDERSTORY VEGETATION AND HABITAT TYPES

(Absence of an entry indicates that data were not available)

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition	Representative habitat type or phase
		Lb/acre		Pct	
2:					
Ambrant	Favorable	600	Pinegrass	35	Douglas-fir/snowberry
	Normal	450	Common snowberry	15	
	Unfavorable	300	Elk sedge	10	
			White spirea	10	
			Blue huckleberry	5	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			Saskatoon serviceberry	2	
			Common beargrass	1	
			Oregongrape	1	
			Twinflower	1	
3:					
Ambrant	Favorable	600	Pinegrass	35	Douglas-fir/snowberry
	Normal	450	Common snowberry	15	
	Unfavorable	300	Elk sedge	10	
			White spirea	10	
			Blue huckleberry	5	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			Saskatoon serviceberry	2	
			Common beargrass	1	
			Oregongrape	1	
			Twinflower	1	
Rochester	Favorable	600	Pinegrass	35	Douglas-fir/snowberry
	Normal	450	Common snowberry	15	
	Unfavorable	300	Elk sedge	10	
			White spirea	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Twinflower	1	
Rock outcrop.					
11:					
Auggie	Favorable	600	Pinegrass	45	Subalpine fir/queencup beadlily
	Normal	500	Common beargrass	15	
	Unfavorable	400	Dwarf huckleberry	15	
			Heartleaf arnica	5	
			White spirea	5	
			Blue huckleberry	2	
			Common pipsissewa	2	
			Grouse whortleberry	2	
			Twinflower	2	
			Kinnikinnick	1	
			Queencup beadlily	1	
12:					
Bata	Favorable	300	Rusty menziesia	25	Subalpine fir/menziesia
	Normal	250	Arnica	20	
	Unfavorable	200	Grouse whortleberry	15	
			Blue huckleberry	10	
			Common beargrass	10	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
13:					
Bata	Favorable	800	Pinegrass	25	Subalpine fir/queencup beadlily
	Normal	600	Blue huckleberry	20	
	Unfavorable	400	Common beargrass	20	
			Arnica	10	
			Grouse whortleberry	10	
			Myrtle pachistima	5	
			Rusty menziesia	5	
			Twinflower	2	
			Queencup beadlily	1	
			Scouler willow	1	
Waldbillig	Favorable	800	Blue huckleberry	25	Subalpine fir/queencup beadlily
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	10	
			Pinegrass	10	
			Grouse whortleberry	5	
			Rusty menziesia	5	
			Dwarf huckleberry	2	
			Elk sedge	2	
			Myrtle pachistima	2	
			Queencup beadlily	2	
			Western meadowrue	2	
			White spirea	2	
			Twinflower	1	
14:					
Beeskove	Favorable	500	Pinegrass	30	Douglas-fir/blue huckleberry, Douglas-fir/twinflower
	Normal	400	Common beargrass	15	
	Unfavorable	300	Blue huckleberry	10	
			Heartleaf arnica	10	
			Common snowberry	5	
			Dwarf huckleberry	5	
			Elk sedge	5	
			White spirea	5	
			Mallow ninebark	2	
			Rocky Mountain maple	2	
			Twinflower	2	
			Kinnikinnick	1	
			Myrtle pachistima	1	
			Oregongrape	1	
15:					
Beeskove	Favorable	500	Pinegrass	30	Douglas-fir/blue huckleberry
	Normal	400	Common beargrass	15	
	Unfavorable	300	Blue huckleberry	10	
			Heartleaf arnica	10	
			Common snowberry	5	
			Dwarf huckleberry	5	
			Elk sedge	5	
			White spirea	5	
			Mallow ninebark	2	
			Rocky Mountain maple	2	
			Twinflower	2	
			Kinnikinnick	1	
			Myrtle pachistima	1	
			Oregongrape	1	
Rock outcrop.					

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
23:					
Bignell	Favorable	800	Pinegrass	30	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	700	Dwarf huckleberry	10	
	Unfavorable	600	Elk sedge	10	
			Blue huckleberry	5	
			Common snowberry	5	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Twinflower	2	
			Oregongrape	1	
24:					
Bignell	Favorable	800	Pinegrass	30	Douglas-fir/dwarf huckleberry, Douglas-fir/twinflower
	Normal	700	Dwarf huckleberry	10	
	Unfavorable	600	Elk sedge	10	
			Blue huckleberry	5	
			Common snowberry	5	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Twinflower	2	
			Oregongrape	1	
Winkler	Favorable	600	Pinegrass	25	Douglas-fir/dwarf huckleberry, Douglas-fir/twinflower
	Normal	450	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	
25:					
Bignell	Favorable	450	Common snowberry	30	Douglas-fir/snowberry, Douglas-fir/pinegrass
	Normal	350	Bluebunch wheatgrass	15	
	Unfavorable	250	Pinegrass	15	
			Elk sedge	10	
			Heartleaf arnica	5	
			Idaho fescue	5	
			Lupine	5	
			White spirea	5	
			Arrowleaf balsamroot	2	
			Kinnikinnick	2	
			Oregongrape	2	
			Saskatoon serviceberry	2	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition	Representative habitat type or phase
		Lb/acre		Pct	
25:					
Winkler----------	Favorable	400	Bluebunch wheatgrass---------	20	Douglas-fir/snowberry,
	Normal	300	Arrowleaf balsamroot---------	15	Douglas-fir/pinegrass
	Unfavorable	200	Elk sedge--------------------	15	
			Pinegrass--------------------	10	
			Common snowberry-------------	5	
			Idaho fescue-----------------	5	
			Rough fescue-----------------	5	
			Heartleaf arnica-------------	2	
			Saskatoon serviceberry-------	2	
			Oregongrape------------------	1	
			Rocky Mountain juniper-------	1	
			Skunkbush sumac--------------	1	
			White spirea-----------------	1	
27:					
Chickaman--------	Favorable	800	Pinegrass--------------------	25	Subalpine fir/twinflower,
	Normal	600	Grouse whortleberry----------	20	subalpine fir/menziesia
	Unfavorable	400	Blue huckleberry-------------	15	
			Arnica-----------------------	10	
			Common beargrass-------------	10	
			Common pipsissewa------------	2	
			Twinflower-------------------	2	
			Alder------------------------	1	
			Sidebells wintergreen--------	1	
28:					
Chickaman--------	Favorable	800	Pinegrass--------------------	25	Subalpine fir/beargrass,
	Normal	600	Grouse whortleberry----------	20	subalpine fir/menziesia
	Unfavorable	400	Blue huckleberry-------------	15	
			Arnica-----------------------	10	
			Common beargrass-------------	10	
			Common pipsissewa------------	2	
			Twinflower-------------------	2	
			Alder------------------------	1	
			Sidebells wintergreen--------	1	
29:					
Coerock----------	Favorable	250	Grouse whortleberry----------	65	Subalpine fir/smooth woodrush
	Normal	200	Arnica-----------------------	5	
	Unfavorable	150	Common beargrass-------------	5	
			Elk sedge--------------------	5	
			Lupine-----------------------	5	
Rock outcrop.					
30:					
Coerock----------	Favorable	250	Grouse whortleberry----------	65	Subalpine fir/smooth woodrush
	Normal	200	Arnica-----------------------	5	
	Unfavorable	150	Common beargrass-------------	5	
			Elk sedge--------------------	5	
			Lupine-----------------------	5	
Rock outcrop.					

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
31:					
Courville	Favorable	1,200	Pinegrass	25	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	1,000	Common snowberry	20	
	Unfavorable	800	Elk sedge	10	
			Arnica	5	
			Dwarf huckleberry	5	
			Mallow ninebark	5	
			Saskatoon serviceberry	5	
			Western meadowrue	5	
			White spirea	5	
			Common beargrass	2	
			Twinflower	1	
32:					
Courville	Favorable	1,200	Pinegrass	25	Douglas-fir/twinflower, Douglas-fir/blue huckleberry
	Normal	1,000	Common snowberry	20	
	Unfavorable	800	Elk sedge	10	
			Arnica	5	
			Dwarf huckleberry	5	
			Mallow ninebark	5	
			Saskatoon serviceberry	5	
			Western meadowrue	5	
			White spirea	5	
			Common beargrass	2	
			Twinflower	1	
Mitten	Favorable	500	Pinegrass	30	Douglas-fir/twinflower, Douglas-fir/blue huckleberry
	Normal	400	Blue huckleberry	20	
	Unfavorable	300	Common beargrass	5	
			Elk sedge	5	
			Heartleaf arnica	5	
			Mallow ninebark	5	
			White spirea	5	
			Kinnikinnick	2	
			Common snowberry	1	
			Grouse whortleberry	1	
			Oregongrape	1	
			Saskatoon serviceberry	1	
			Twinflower	1	
33:					
Crow	Favorable	700	Pinegrass	25	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	600	Common snowberry	10	
	Unfavorable	500	Elk sedge	10	
			Heartleaf arnica	10	
			Dwarf huckleberry	5	
			White spirea	5	
			Blue huckleberry	2	
			Kinnikinnick	2	
			Oregongrape	2	
			Saskatoon serviceberry	2	
			Twinflower	2	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition	Representative habitat type or phase
		Lb/acre		Pct	
35:					
Elkner	Favorable	600	Pinegrass	25	Subalpine fir/beargrass,
	Normal	500	Blue huckleberry	20	subalpine fir/grouse
	Unfavorable	400	Elk sedge	10	whortleberry
			Heartleaf arnica	10	
			Common beargrass	5	
			Grouse whortleberry	5	
			Saskatoon serviceberry	5	
			White spirea	5	
			Common pipsissewa	1	
			Kinnikinnick	1	
			Oregongrape	1	
			Twinflower	1	
Ovando	Favorable	400	Pinegrass	25	Subalpine fir/beargrass,
	Normal	350	Blue huckleberry	20	subalpine fir/grouse
	Unfavorable	300	Elk sedge	10	whortleberry
			Heartleaf arnica	10	
			Common beargrass	5	
			Grouse whortleberry	5	
			Saskatoon serviceberry	5	
			White spirea	5	
			Common pipsissewa	1	
			Kinnikinnick	1	
			Oregongrape	1	
			Twinflower	1	
36:					
Evaro	Favorable	500	Pinegrass	30	Subalpine fir/twinflower,
	Normal	400	Grouse whortleberry	20	subalpine fir/menziesia
	Unfavorable	300	Rusty menziesia	10	
			Common beargrass	5	
			Elk sedge	5	
			Russet buffaloberry	5	
			Twinflower	5	
			Heartleaf arnica	2	
			Kinnikinnick	1	
			White spirea	1	
37:					
Evaro	Favorable	500	Pinegrass	30	Subalpine fir/twinflower,
	Normal	400	Grouse whortleberry	20	subalpine fir/menziesia
	Unfavorable	300	Rusty menziesia	10	
			Common beargrass	5	
			Elk sedge	5	
			Russet buffaloberry	5	
			Twinflower	5	
			Heartleaf arnica	2	
			Kinnikinnick	1	
			White spirea	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
38:					
Felan	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	30	
	Unfavorable	400	Arnica	10	
			Grouse whortleberry	5	
			Pinegrass	5	
			Dwarf huckleberry	2	
			Myrtle pachistima	2	
			Rusty menziesia	2	
			Twinflower	2	
			White spirea	2	
			Lupine	1	
39:					
Felan	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	30	
	Unfavorable	400	Arnica	10	
			Grouse whortleberry	5	
			Pinegrass	5	
			Dwarf huckleberry	2	
			Myrtle pachistima	2	
			Rusty menziesia	2	
			Twinflower	2	
			White spirea	2	
			Lupine	1	
40:					
Felan	Favorable	300	Grouse whortleberry	45	Subalpine fir/grouse whortleberry, subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Blue huckleberry	5	
			Pinegrass	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Twinflower	2	
			Lupine	1	
			White spirea	1	
41:					
Felan	Favorable	300	Grouse whortleberry	45	Subalpine fir/grouse whortleberry, subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Blue huckleberry	5	
			Pinegrass	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Twinflower	2	
			Lupine	1	
			White spirea	1	
42:					
Glaciercreek	Favorable	300	Pinegrass	30	Douglas-fir/dwarf huckleberry
	Normal	200	Elk sedge	15	
	Unfavorable	100	Common snowberry	10	
			Kinnikinnick	10	
			Common juniper	5	
			Dwarf huckleberry	5	
			Heartleaf arnica	5	
			White spirea	5	
			Saskatoon serviceberry	2	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
43:					
Glaciercreek variant	Favorable	300	Pinegrass	30	Douglas-fir/snowberry
	Normal	200	Elk sedge	15	
	Unfavorable	100	Common snowberry	10	
			Kinnikinnick	10	
			Common juniper	5	
			Dwarf huckleberry	5	
			Heartleaf arnica	5	
			White spirea	5	
Glaciercreek	Favorable	300	Pinegrass	30	Douglas-fir/snowberry
	Normal	200	Elk sedge	15	
	Unfavorable	100	Common snowberry	10	
			Kinnikinnick	10	
			Common juniper	5	
			Dwarf huckleberry	5	
			Heartleaf arnica	5	
			White spirea	5	
			Saskatoon serviceberry	2	
49:					
Greenough	Favorable	800	Common snowberry	20	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	650	Pinegrass	20	
	Unfavorable	500	Idaho fescue	10	
			White spirea	10	
			Elk sedge	5	
			Heartleaf arnica	5	
			Oregongrape	5	
			Common juniper	2	
			Kinnikinnick	2	
			Saskatoon serviceberry	2	
			Arrowleaf balsamroot	1	
			Lupine	1	
50:					
Hagstadt	Favorable	700	Common snowberry	25	Douglas-fir/snowberry
	Normal	500	Arrowleaf balsamroot	15	
	Unfavorable	400	Idaho fescue	15	
			White spirea	10	
			Elk sedge	5	
			Heartleaf arnica	5	
			Pinegrass	5	
			Kinnikinnick	2	
			Oregongrape	2	
			Saskatoon serviceberry	2	
			Bluebunch wheatgrass	1	
51:					
Half Moon	Favorable	700	Pinegrass	30	Douglas-fir/snowberry
	Normal	650	Common snowberry	15	
	Unfavorable	400	Elk sedge	15	
			Heartleaf arnica	10	
			Western meadowrue	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Kinnikinnick	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
53:					
Hollandlake	Favorable	800	Blue huckleberry	30	Subalpine fir/queencup beadlily
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	15	
			Myrtle pachistima	5	
			Pinegrass	5	
			Rusty menziesia	5	
			Scouler willow	3	
			Queencup beadlily	2	
			Twinflower	2	
			Western meadowrue	1	
54:					
Hollandlake	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	15	
			Myrtle pachistima	5	
			Pinegrass	5	
			Rusty menziesia	5	
			Scouler willow	3	
			Queencup beadlily	2	
			Twinflower	2	
			Western meadowrue	1	
Bata	Favorable	800	Pinegrass	25	Subalpine fir/twinflower
	Normal	600	Blue huckleberry	20	
	Unfavorable	400	Common beargrass	20	
			Arnica	10	
			Grouse whortleberry	10	
			Myrtle pachistima	5	
			Rusty menziesia	5	
			Twinflower	2	
			Queencup beadlily	1	
			Scouler willow	1	
55:					
Hollandlake	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	15	
			Myrtle pachistima	5	
			Pinegrass	5	
			Rusty menziesia	5	
			Scouler willow	3	
			Queencup beadlily	2	
			Twinflower	2	
			Western meadowrue	1	
Bata	Favorable	800	Pinegrass	25	Subalpine fir/twinflower
	Normal	600	Blue huckleberry	20	
	Unfavorable	400	Common beargrass	20	
			Arnica	10	
			Grouse whortleberry	10	
			Myrtle pachistima	5	
			Rusty menziesia	5	
			Twinflower	2	
			Queencup beadlily	1	
			Scouler willow	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo-sition	Representative habitat type or phase
		Lb/acre		Pct	
56:					
Holloway	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	30	
	Unfavorable	400	Arnica	10	
			Grouse whortleberry	5	
			Pinegrass	5	
			Dwarf huckleberry	2	
			Myrtle pachistima	2	
			Rusty menziesia	2	
			White spirea	2	
57:					
Holloway	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	30	
	Unfavorable	400	Arnica	10	
			Grouse whortleberry	5	
			Pinegrass	5	
			Dwarf huckleberry	2	
			Myrtle pachistima	2	
			Rusty menziesia	2	
			White spirea	2	
58:					
Holloway	Favorable	300	Grouse whortleberry	40	Subalpine fir/grouse whortleberry, subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Pinegrass	10	
			Blue huckleberry	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Common juniper	1	
			White spirea	1	
59:					
Holloway	Favorable	300	Grouse whortleberry	40	Subalpine fir/grouse whortleberry, subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Pinegrass	10	
			Blue huckleberry	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Common juniper	1	
			White spirea	1	
60:					
Holloway	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	30	
	Unfavorable	400	Arnica	10	
			Grouse whortleberry	5	
			Pinegrass	5	
			Dwarf huckleberry	2	
			Myrtle pachistima	2	
			Rusty menziesia	2	
			White spirea	2	
Rock outcrop.					

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
61:					
Jimlake	Favorable	900	Arnica	20	Subalpine fir/queencup beadlily
	Normal	700	Queencup beadlily	15	
	Unfavorable	500	Blue huckleberry	10	
			Pinegrass	10	
			Myrtle pachistima	5	
			Thimbleberry	5	
			Twinflower	5	
			Western meadowrue	5	
			White spirea	5	
			Common beargrass	2	
			Saskatoon serviceberry	1	
62:					
Jimlake	Favorable	900	Arnica	20	Subalpine fir/queencup beadlily, subalpine fir/menziesia
	Normal	700	Queencup beadlily	15	
	Unfavorable	500	Blue huckleberry	10	
			Pinegrass	10	
			Myrtle pachistima	5	
			Thimbleberry	5	
			Twinflower	5	
			Western meadowrue	5	
			White spirea	5	
			Common beargrass	2	
			Saskatoon serviceberry	1	
63:					
Lantern	Favorable	600	Pinegrass	30	Douglas-fir/twinflower, Douglas-fir/ninebark
	Normal	500	Common beargrass	10	
	Unfavorable	400	Common snowberry	10	
			Mallow ninebark	10	
			Blue huckleberry	5	
			Kinnikinnick	5	
			Oregongrape	5	
			Twinflower	5	
64:					
Lantern	Favorable	600	Pinegrass	30	Douglas-fir/twinflower, Douglas-fir/ninebark
	Normal	500	Common beargrass	10	
	Unfavorable	400	Common snowberry	10	
			Mallow ninebark	10	
			Blue huckleberry	5	
			Kinnikinnick	5	
			Oregongrape	5	
			Twinflower	5	
65:					
Lantern	Favorable	600	Pinegrass	30	Douglas-fir/twinflower, Douglas-fir/ninebark
	Normal	500	Common beargrass	10	
	Unfavorable	400	Common snowberry	10	
			Mallow ninebark	10	
			Blue huckleberry	5	
			Kinnikinnick	5	
			Oregongrape	5	
			Twinflower	5	
Rock outcrop.					

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
66:					
Lolopeak	Favorable	250	Grouse whortleberry	55	Subalpine fir/grouse whortleberry, whitebark pine-subalpine fir
	Normal	200	Arnica	5	
	Unfavorable	150	Common beargrass	5	
			Elk sedge	5	
			Lupine	5	
			Red mountainheath	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
67:					
Lolopeak	Favorable	250	Grouse whortleberry	55	Subalpine fir/grouse whortleberry, whitebark pine-subalpine fir
	Normal	200	Arnica	5	
	Unfavorable	150	Common beargrass	5	
			Elk sedge	5	
			Lupine	5	
			Red mountainheath	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
Rock outcrop.					
68:					
Lubrecht	Favorable	800	Pinegrass	30	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	650	Common snowberry	15	
	Unfavorable	500	Elk sedge	10	
			Dwarf huckleberry	5	
			Heartleaf arnica	5	
			Saskatoon serviceberry	5	
			White spirea	5	
			Mallow ninebark	2	
			Oregongrape	1	
69:					
Mitten	Favorable	500	Pinegrass	30	Douglas-fir/twinflower, Douglas-fir/blue huckleberry
	Normal	400	Blue huckleberry	20	
	Unfavorable	300	Common beargrass	5	
			Elk sedge	5	
			Heartleaf arnica	5	
			Mallow ninebark	5	
			White spirea	5	
			Kinnikinnick	2	
			Common snowberry	1	
			Grouse whortleberry	1	
			Oregongrape	1	
			Saskatoon serviceberry	1	
			Twinflower	1	
70:					
Mitten	Favorable	500	Pinegrass	30	Douglas-fir/blue huckleberry, Douglas-fir/twinflower
	Normal	400	Blue huckleberry	20	
	Unfavorable	300	Common beargrass	5	
			Elk sedge	5	
			Heartleaf arnica	5	
			Mallow ninebark	5	
			White spirea	5	
			Kinnikinnick	2	
			Common snowberry	1	
			Grouse whortleberry	1	
			Oregongrape	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
70:					
Sharrott	Favorable	400	Pinegrass	35	---
	Normal	300	Elk sedge	20	
	Unfavorable	200	Mallow ninebark	20	
			Arrowleaf balsamroot	5	
			Common snowberry	5	
			Oregongrape	5	
71:					
Mitten	Favorable	500	Pinegrass	30	Douglas-fir/twinflower, Douglas-fir/blue huckleberry
	Normal	400	Blue huckleberry	20	
	Unfavorable	300	Common beargrass	5	
			Elk sedge	5	
			Heartleaf arnica	5	
			Mallow ninebark	5	
			White spirea	5	
			Kinnikinnick	2	
			Common snowberry	1	
			Grouse whortleberry	1	
			Oregongrape	1	
			Saskatoon serviceberry	1	
			Twinflower	1	
Tevis	Favorable	600	Pinegrass	25	Douglas-fir/twinflower, Douglas-fir/blue huckleberry
	Normal	450	Common beargrass	15	
	Unfavorable	350	Common snowberry	15	
			Blue huckleberry	10	
			Heartleaf arnica	10	
			Elk sedge	5	
			Grouse whortleberry	5	
			White spirea	5	
			Western meadowrue	3	
			Mountain sweetroot	2	
			Twinflower	2	
			Kinnikinnick	1	
			Saskatoon serviceberry	1	
74:					
Ovando	Favorable	400	Pinegrass	25	Subalpine fir/menziesia, subalpine fir/twinflower
	Normal	350	Blue huckleberry	20	
	Unfavorable	300	Elk sedge	10	
			Heartleaf arnica	10	
			Common beargrass	5	
			Grouse whortleberry	5	
			Saskatoon serviceberry	5	
			White spirea	5	
			Common pipsissewa	1	
			Kinnikinnick	1	
			Oregongrape	1	
			Twinflower	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition	Representative habitat type or phase
		Lb/acre		Pct	
74:					
Elkner	Favorable	600	Pinegrass	25	Subalpine fir/menziesia, subalpine fir/twinflower
	Normal	500	Blue huckleberry	20	
	Unfavorable	400	Elk sedge	10	
			Heartleaf arnica	10	
			Common beargrass	5	
			Grouse whortleberry	5	
			Saskatoon serviceberry	5	
			White spirea	5	
			Common pipsissewa	1	
			Kinnikinnick	1	
			Oregongrape	1	
			Twinflower	1	
Rock outcrop.					
80:					
Petty	Favorable	900	Rusty menziesia	40	Subalpine fir/menziesia, subalpine fir/queencup beadlily
	Normal	800	Blue huckleberry	20	
	Unfavorable	700	Arnica	10	
			Common beargrass	10	
			Bunchberry dogwood	1	
			Grouse whortleberry	1	
			Queencup beadlily	1	
			Sweetscented bedstraw	1	
			Twinflower	1	
			Wintergreen	1	
81:					
Petty	Favorable	900	Rusty menziesia	40	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	800	Blue huckleberry	20	
	Unfavorable	700	Arnica	10	
			Common beargrass	10	
			Bunchberry dogwood	1	
			Grouse whortleberry	1	
			Queencup beadlily	1	
			Sweetscented bedstraw	1	
			Twinflower	1	
			Wintergreen	1	
82:					
Petty	Favorable	900	Rusty menziesia	40	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	800	Blue huckleberry	20	
	Unfavorable	700	Arnica	10	
			Common beargrass	10	
			Bunchberry dogwood	1	
			Grouse whortleberry	1	
			Queencup beadlily	1	
			Sweetscented bedstraw	1	
			Twinflower	1	
			Wintergreen	1	
83:					
Petty	Favorable	700	Rusty menziesia	30	Subalpine fir/menziesia, subalpine fir/queencup beadlily
	Normal	500	Blue huckleberry	15	
	Unfavorable	400	Arnica	10	
			Common beargrass	10	
			Grouse whortleberry	10	
			Alder	5	
			Smooth woodrush	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
84:					
Petty	Favorable	700	Rusty menziesia	30	Subalpine fir/menziesia
	Normal	500	Blue huckleberry	15	
	Unfavorable	400	Arnica	10	
			Common beargrass	10	
			Grouse whortleberry	10	
			Alder	5	
			Smooth woodrush	1	
			Twinflower	1	
			Wintergreen	1	
85:					
Petty	Favorable	700	Rusty menziesia	30	Subalpine fir/menziesia
	Normal	500	Blue huckleberry	15	
	Unfavorable	400	Arnica	10	
			Common beargrass	10	
			Grouse whortleberry	10	
			Alder	5	
			Smooth woodrush	1	
			Twinflower	1	
			Wintergreen	1	
Rock outcrop.					
86:					
Phillcher	Favorable	250	Grouse whortleberry	35	Subalpine fir/smooth woodrush
	Normal	200	Arnica	10	
	Unfavorable	150	Sedge	10	
			Smooth woodrush	10	
			Blue huckleberry	5	
			Common beargrass	5	
			Lupine	5	
			Red mountainheath	5	
			Rusty menziesia	5	
87:					
Phillcher	Favorable	250	Grouse whortleberry	35	Subalpine fir/smooth woodrush
	Normal	200	Arnica	10	
	Unfavorable	150	Sedge	10	
			Smooth woodrush	10	
			Blue huckleberry	5	
			Common beargrass	5	
			Lupine	5	
			Red mountainheath	5	
			Rusty menziesia	5	
Rock outcrop.					
89:					
Repp	Favorable	600	Bluebunch wheatgrass	30	Douglas-fir/snowberry, Douglas-fir/ninebark-pinegrass phase
	Normal	450	Common snowberry	15	
	Unfavorable	300	Pinegrass	15	
			Arrowleaf balsamroot	10	
			Rough fescue	10	
			Heartleaf arnica	5	
			Idaho fescue	5	
			Mallow ninebark	2	
			Oregongrape	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
90:					
Repp	Favorable	800	Common snowberry	25	Douglas-fir/ninebark-ninebark phase
	Normal	600	Pinegrass	20	
	Unfavorable	400	Mallow ninebark	15	
			Elk sedge	10	
			Heartleaf arnica	5	
			Idaho fescue	5	
			White spirea	5	
			Arrowleaf balsamroot	1	
			Bluebunch wheatgrass	1	
			Oregongrape	1	
			Rough fescue	1	
			Saskatoon serviceberry	1	
91:					
Repp	Favorable	800	Common snowberry	25	Douglas-fir/ninebark-ninebark phase
	Normal	600	Pinegrass	20	
	Unfavorable	400	Mallow ninebark	15	
			Elk sedge	10	
			Heartleaf arnica	5	
			Idaho fescue	5	
			White spirea	5	
			Arrowleaf balsamroot	1	
			Bluebunch wheatgrass	1	
			Oregongrape	1	
			Rough fescue	1	
			Saskatoon serviceberry	1	
92:					
Repp	Favorable	600	Bluebunch wheatgrass	30	Douglas-fir/snowberry
	Normal	450	Common snowberry	15	
	Unfavorable	300	Pinegrass	15	
			Arrowleaf balsamroot	10	
			Rough fescue	10	
			Heartleaf arnica	5	
			Idaho fescue	5	
			Mallow ninebark	2	
			Oregongrape	1	
Rock outcrop.					
95:					
Rumblecreek	Favorable	700	Pinegrass	35	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	500	Arnica	10	
	Unfavorable	300	Common snowberry	10	
			Elk sedge	10	
			Dwarf huckleberry	5	
			Saskatoon serviceberry	5	
			White spirea	5	
			Kinnikinnick	2	
			Oregongrape	1	
96:					
Selway	Favorable	350	Pinegrass	35	Douglas-fir/dwarf huckleberry, Douglas-fir/blue huckleberry-beargrass phase
	Normal	300	Dwarf huckleberry	10	
	Unfavorable	250	Elk sedge	10	
			Kinnikinnick	10	
			White spirea	10	
			Common snowberry	5	
			Heartleaf arnica	5	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production		Characteristic vegetation	Composition	Representative habitat type or phase
	Kind of year	Dry weight			
		Lb/acre		Pct	
97:					
Selway	Favorable	350	Pinegrass	35	Douglas-fir/dwarf huckleberry, Douglas-fir/blue huckleberry-beargrass phase
	Normal	300	Dwarf huckleberry	10	
	Unfavorable	250	Elk sedge	10	
			Kinnikinnick	10	
			White spirea	10	
			Common snowberry	5	
			Heartleaf arnica	5	
			Twinflower	5	
98:					
Selway	Favorable	350	Pinegrass	35	Douglas-fir/dwarf huckleberry, Douglas-fir/blue huckleberry-beargrass phase
	Normal	300	Dwarf huckleberry	10	
	Unfavorable	250	Elk sedge	10	
			Kinnikinnick	10	
			White spirea	10	
			Common snowberry	5	
			Heartleaf arnica	5	
			Twinflower	5	
99:					
Sharrott	Favorable	300	Bluebunch wheatgrass	60	Ponderosa pine/bluebunch wheatgrass
	Normal	200	Arrowleaf balsamroot	15	
	Unfavorable	100	Idaho fescue	15	
Rock outcrop.					
100:					
Shooflin	Favorable	800	Pinegrass	30	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	650	Common snowberry	10	
	Unfavorable	500	Elk sedge	10	
			Arnica	5	
			Dwarf huckleberry	5	
			Kinnikinnick	5	
			Saskatoon serviceberry	5	
			White spirea	5	
			Common juniper	1	
			Mallow ninebark	1	
			Oregongrape	1	
			Twinflower	1	
102:					
Tevis	Favorable	600	Pinegrass	25	Douglas-fir/blue huckleberry
	Normal	450	Common beargrass	15	
	Unfavorable	350	Common snowberry	15	
			Blue huckleberry	10	
			Heartleaf arnica	10	
			Elk sedge	5	
			Grouse whortleberry	5	
			White spirea	5	
			Western meadowrue	3	
			Mountain sweetroot	2	
			Twinflower	2	
			Kinnikinnick	1	
			Saskatoon serviceberry	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
103:					
Tevis	Favorable	600	Pinegrass	25	Douglas-fir/blue huckleberry-beargrass phase
	Normal	450	Common beargrass	15	
	Unfavorable	350	Common snowberry	15	
			Blue huckleberry	10	
			Heartleaf arnica	10	
			Elk sedge	5	
			Grouse whortleberry	5	
			White spirea	5	
			Western meadowrue	3	
			Mountain sweetroot	2	
			Twinflower	2	
			Kinnikinnick	1	
			Saskatoon serviceberry	1	
Mitten	Favorable	500	Pinegrass	30	Douglas-fir/blue huckleberry-beargrass phase
	Normal	400	Blue huckleberry	20	
	Unfavorable	300	Common beargrass	5	
			Elk sedge	5	
			Heartleaf arnica	5	
			Mallow ninebark	5	
			White spirea	5	
			Kinnikinnick	2	
			Common snowberry	1	
			Grouse whortleberry	1	
			Oregongrape	1	
			Saskatoon serviceberry	1	
			Twinflower	1	
104:					
Tevis	Favorable	600	Pinegrass	25	Douglas-fir/twinflower, Douglas-fir/blue huckleberry
	Normal	450	Common beargrass	15	
	Unfavorable	350	Common snowberry	15	
			Blue huckleberry	10	
			Heartleaf arnica	10	
			Elk sedge	5	
			Grouse whortleberry	5	
			White spirea	5	
			Western meadowrue	3	
			Mountain sweetroot	2	
			Twinflower	2	
			Kinnikinnick	1	
			Saskatoon serviceberry	1	
Mitten	Favorable	500	Pinegrass	30	Douglas-fir/twinflower, Douglas-fir/blue huckleberry
	Normal	400	Blue huckleberry	20	
	Unfavorable	300	Common beargrass	5	
			Elk sedge	5	
			Heartleaf arnica	5	
			Mallow ninebark	5	
			White spirea	5	
			Kinnikinnick	2	
			Common snowberry	1	
			Grouse whortleberry	1	
			Oregongrape	1	
			Saskatoon serviceberry	1	
			Twinflower	1	
Rock outcrop.					

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
105:					
Totelake	Favorable	500	Pinegrass	25	Douglas-fir/ninebark,
	Normal	350	Elk sedge	15	Douglas-fir/pinegrass
	Unfavorable	200	Idaho fescue	10	
			Rough fescue	10	
			Common snowberry	5	
			Heartleaf arnica	5	
			White spirea	5	
			Common juniper	2	
			Kinnikinnick	2	
			Mallow ninebark	2	
			Oregongrape	2	
			Bluebunch wheatgrass	1	
106:					
Totelake	Favorable	500	Pinegrass	25	Douglas-fir/ninebark,
	Normal	350	Elk sedge	15	Douglas-fir/pinegrass
	Unfavorable	200	Idaho fescue	10	
			Rough fescue	10	
			Common snowberry	5	
			Heartleaf arnica	5	
			White spirea	5	
			Common juniper	2	
			Kinnikinnick	2	
			Mallow ninebark	2	
			Oregongrape	2	
			Bluebunch wheatgrass	1	
107:					
Totelake	Favorable	400	Pinegrass	25	Douglas-fir/snowberry,
	Normal	300	Elk sedge	15	Douglas-fir/pinegrass
	Unfavorable	200	Idaho fescue	10	
			Rough fescue	10	
			Common snowberry	5	
			Heartleaf arnica	5	
			White spirea	5	
			Kinnikinnick	2	
			Mallow ninebark	2	
			Oregongrape	2	
			Bluebunch wheatgrass	1	
			Common juniper	1	
			Western meadowrue	1	
108:					
Trapps	Favorable	500	Pinegrass	25	Douglas-fir/ninebark
	Normal	400	Common snowberry	20	
	Unfavorable	300	Elk sedge	10	
			Heartleaf arnica	5	
			Western meadowrue	5	
			White spirea	5	
			Oregongrape	2	
			Saskatoon serviceberry	2	
			Common pipsissewa	1	
			Kinnikinnick	1	
			Russet buffaloberry	1	
			Woods rose	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
109:					
Trapps	Favorable	500	Pinegrass	25	Douglas-fir/ninebark
	Normal	400	Common snowberry	20	
	Unfavorable	300	Elk sedge	10	
			Heartleaf arnica	5	
			Western meadowrue	5	
			White spirea	5	
			Oregongrape	2	
			Saskatoon serviceberry	2	
			Common pipsissewa	1	
			Kinnikinnick	1	
			Russet buffaloberry	1	
			Woods rose	1	
112:					
Udorthents.					
Glaciercreek	Favorable	300	Pinegrass	30	Douglas-fir/twinflower
	Normal	200	Elk sedge	15	
	Unfavorable	100	Common snowberry	10	
			Kinnikinnick	10	
			Common juniper	5	
			Dwarf huckleberry	5	
			Heartleaf arnica	5	
			White spirea	5	
			Saskatoon serviceberry	2	
113:					
Upsata	Favorable	300	Pinegrass	40	Subalpine fir/dwarf huckleberry, subalpine fir/beargrass
	Normal	200	Dwarf huckleberry	20	
	Unfavorable	100	Common beargrass	10	
			Elk sedge	5	
			Grouse whortleberry	5	
			Blue huckleberry	2	
			Kinnikinnick	2	
			Myrtle pachistima	2	
			Common juniper	1	
			Common pipsissewa	1	
			Heartleaf arnica	1	
			Oregongrape	1	
			Russet buffaloberry	1	
			Twinflower	1	
			White spirea	1	
115:					
Waldbillig	Favorable	800	Blue huckleberry	25	Subalpine fir/queencup beadlily
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	10	
			Pinegrass	10	
			Grouse whortleberry	5	
			Rusty menziesia	5	
			Dwarf huckleberry	2	
			Elk sedge	2	
			Myrtle pachistima	2	
			Queencup beadlily	2	
			Western meadowrue	2	
			White spirea	2	
			Twinflower	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production		Characteristic vegetation	Compo- sition	Representative habitat type or phase
	Kind of year	Dry weight			
		Lb/acre		Pct	
116:					
Waldbillig	Favorable	800	Blue huckleberry	25	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	10	
			Pinegrass	10	
			Grouse whortleberry	5	
			Rusty menziesia	5	
			Dwarf huckleberry	2	
			Elk sedge	2	
			Myrtle pachistima	2	
			Queencup beadlily	2	
			Western meadowrue	2	
			White spirea	2	
			Twinflower	1	
117:					
Waldbillig	Favorable	800	Blue huckleberry	25	Subalpine fir/queencup beadlily
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	10	
			Pinegrass	10	
			Grouse whortleberry	5	
			Rusty menziesia	5	
			Dwarf huckleberry	2	
			Elk sedge	2	
			Myrtle pachistima	2	
			Queencup beadlily	2	
			Western meadowrue	2	
			White spirea	2	
			Twinflower	1	
Auggie	Favorable	600	Pinegrass	45	Subalpine fir/queencup beadlily
	Normal	500	Common beargrass	15	
	Unfavorable	400	Dwarf huckleberry	15	
			Heartleaf arnica	5	
			White spirea	5	
			Blue huckleberry	2	
			Common pipsissewa	2	
			Grouse whortleberry	2	
			Twinflower	2	
			Kinnikinnick	1	
			Queencup beadlily	1	
118:					
Waldbillig	Favorable	800	Blue huckleberry	25	Subalpine fir/twinflower
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	10	
			Pinegrass	10	
			Grouse whortleberry	5	
			Rusty menziesia	5	
			Dwarf huckleberry	2	
			Elk sedge	2	
			Myrtle pachistima	2	
			Queencup beadlily	2	
			Western meadowrue	2	
			White spirea	2	
			Twinflower	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition	Representative habitat type or phase
		Lb/acre		Pct	
118:					
Holloway	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower
	Normal	600	Common beargrass	30	
	Unfavorable	400	Arnica	10	
			Grouse whortleberry	5	
			Pinegrass	5	
			Dwarf huckleberry	2	
			Myrtle pachistima	2	
			Rusty menziesia	2	
			White spirea	2	
119:					
Waldbillig	Favorable	800	Blue huckleberry	25	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	25	
	Unfavorable	400	Arnica	10	
			Pinegrass	10	
			Grouse whortleberry	5	
			Rusty menziesia	5	
			Dwarf huckleberry	2	
			Elk sedge	2	
			Myrtle pachistima	2	
			Queencup beadlily	2	
			Western meadowrue	2	
			White spirea	2	
			Twinflower	1	
Holloway	Favorable	800	Blue huckleberry	30	Subalpine fir/twinflower, subalpine fir/menziesia
	Normal	600	Common beargrass	30	
	Unfavorable	400	Arnica	10	
			Grouse whortleberry	5	
			Pinegrass	5	
			Dwarf huckleberry	2	
			Myrtle pachistima	2	
			Rusty menziesia	2	
			White spirea	2	
120:					
Waldbillig	Favorable	300	Grouse whortleberry	40	Subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Pinegrass	10	
			Blue huckleberry	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Common juniper	1	
			White spirea	1	
Holloway	Favorable	300	Grouse whortleberry	40	Subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Pinegrass	10	
			Blue huckleberry	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Common juniper	1	
			White spirea	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
121:					
Waldbillig	Favorable	300	Grouse whortleberry	40	Subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Pinegrass	10	
			Blue huckleberry	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Common juniper	1	
			White spirea	1	
Holloway	Favorable	300	Grouse whortleberry	40	Subalpine fir/menziesia
	Normal	250	Arnica	10	
	Unfavorable	200	Common beargrass	10	
			Elk sedge	10	
			Pinegrass	10	
			Blue huckleberry	5	
			Rusty menziesia	5	
			Smooth woodrush	5	
			Common juniper	1	
			White spirea	1	
122:					
Whitore	Favorable	450	Pinegrass	30	Douglas-fir/twinflower
	Normal	350	Common snowberry	15	
	Unfavorable	250	Heartleaf arnica	10	
			White spirea	5	
			Mallow ninebark	2	
			Twinflower	1	
123:					
Whitore	Favorable	450	Pinegrass	30	Douglas-fir/twinflower
	Normal	350	Common snowberry	15	
	Unfavorable	250	Heartleaf arnica	10	
			White spirea	5	
			Mallow ninebark	2	
			Twinflower	1	
124:					
Wildgen	Favorable	500	Pinegrass	25	Douglas-fir/snowberry
	Normal	400	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	
125:					
Wildgen	Favorable	500	Pinegrass	25	Douglas-fir/snowberry
	Normal	400	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition	Representative habitat type or phase
		Lb/acre		Pct	
125:					
Winkler	Favorable	600	Pinegrass	25	Douglas-fir/snowberry
	Normal	450	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	
126:					
Wildgen	Favorable	500	Pinegrass	25	Douglas-fir/snowberry
	Normal	400	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	
Winkler	Favorable	600	Pinegrass	25	Douglas-fir/snowberry
	Normal	450	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	
127:					
Wildgen	Favorable	400	Bluebunch wheatgrass	20	Douglas-fir/snowberry
	Normal	300	Arrowleaf balsamroot	15	
	Unfavorable	200	Elk sedge	15	
			Pinegrass	10	
			Common snowberry	5	
			Idaho fescue	5	
			Rough fescue	5	
			Heartleaf arnica	2	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Rocky Mountain juniper	1	
			Skunkbush sumac	1	
			White spirea	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition	Representative habitat type or phase
		Lb/acre		Pct	
127:					
Winkler	Favorable	400	Bluebunch wheatgrass	20	Douglas-fir/snowberry
	Normal	300	Arrowleaf balsamroot	15	
	Unfavorable	200	Elk sedge	15	
			Pinegrass	10	
			Common snowberry	5	
			Idaho fescue	5	
			Rough fescue	5	
			Heartleaf arnica	2	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Rocky Mountain juniper	1	
			Skunkbush sumac	1	
			White spirea	1	
128:					
Wildgen	Favorable	400	Bluebunch wheatgrass	20	Douglas-fir/snowberry
	Normal	300	Arrowleaf balsamroot	15	
	Unfavorable	200	Elk sedge	15	
			Pinegrass	10	
			Common snowberry	5	
			Idaho fescue	5	
			Rough fescue	5	
			Heartleaf arnica	2	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Rocky Mountain juniper	1	
			Skunkbush sumac	1	
			White spirea	1	
Winkler	Favorable	400	Bluebunch wheatgrass	20	Douglas-fir/snowberry
	Normal	300	Arrowleaf balsamroot	15	
	Unfavorable	200	Elk sedge	15	
			Pinegrass	10	
			Common snowberry	5	
			Idaho fescue	5	
			Rough fescue	5	
			Heartleaf arnica	2	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Rocky Mountain juniper	1	
			Skunkbush sumac	1	
			White spirea	1	
129:					
Winfall	Favorable	1,000	Pinegrass	22	Douglas-fir/dwarf huckleberry, Douglas-fir/snowberry
	Normal	800	Elk sedge	13	
	Unfavorable	600	Kinnikinnick	10	
			Dwarf huckleberry	8	
			Blue huckleberry	6	
			Heartleaf arnica	6	
			Common beargrass	4	
			Common snowberry	3	
			Oregongrape	2	
			White spirea	2	
			Saskatoon serviceberry	1	
			Twinflower	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition	Representative habitat type or phase
		Lb/acre		Pct	
130:					
Winkler	Favorable	400	Bluebunch wheatgrass	20	Douglas-fir/snowberry
	Normal	300	Arrowleaf balsamroot	15	
	Unfavorable	200	Elk sedge	15	
			Pinegrass	10	
			Common snowberry	5	
			Idaho fescue	5	
			Rough fescue	5	
			Heartleaf arnica	2	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Rocky Mountain juniper	1	
			Skunkbush sumac	1	
			White spirea	1	
131:					
Winkler	Favorable	400	Bluebunch wheatgrass	20	Douglas-fir/ninebark-pinegrass phase, Douglas-fir/snowberry
	Normal	300	Arrowleaf balsamroot	15	
	Unfavorable	200	Elk sedge	15	
			Pinegrass	10	
			Common snowberry	5	
			Idaho fescue	5	
			Rough fescue	5	
			Heartleaf arnica	2	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Rocky Mountain juniper	1	
			Skunkbush sumac	1	
			White spirea	1	
132:					
Winkler	Favorable	600	Pinegrass	25	Douglas-fir/ninebark-ninebark phase
	Normal	450	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	
133:					
Winkler	Favorable	600	Pinegrass	25	Douglas-fir/ninebark-ninebark phase
	Normal	450	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	

UNDERSTORY VEGETATION AND HABITAT TYPES--Continued

Map symbol and soil name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo-sition	Representative habitat type or phase
		Lb/acre		Pct	
134:					
Winkler	Favorable	400	Bluebunch wheatgrass	20	Douglas-fir/ninebark-pinegrass phase, Douglas-fir/snowberry
	Normal	300	Arrowleaf balsamroot	15	
	Unfavorable	200	Elk sedge	15	
			Pinegrass	10	
			Common snowberry	5	
			Idaho fescue	5	
			Rough fescue	5	
			Heartleaf arnica	2	
			Saskatoon serviceberry	2	
			Oregongrape	1	
			Rocky Mountain juniper	1	
			Skunkbush sumac	1	
			White spirea	1	
Rubble land.					
135:					
Winkler	Favorable	600	Pinegrass	25	Douglas-fir/ninebark-ninebark phase
	Normal	450	Elk sedge	20	
	Unfavorable	300	Common snowberry	10	
			Mallow ninebark	10	
			Heartleaf arnica	5	
			Kinnikinnick	5	
			White spirea	5	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	
Rock outcrop.					
137:					
Yourame	Favorable	500	Pinegrass	30	Douglas-fir/snowberry
	Normal	400	Elk sedge	14	
	Unfavorable	300	Mallow ninebark	10	
			Common snowberry	8	
			White spirea	5	
			Heartleaf arnica	4	
			Kinnikinnick	4	
			Dwarf huckleberry	2	
			Saskatoon serviceberry	2	
			Idaho fescue	1	
			Oregongrape	1	

Forest Land

The Missoula County area is one of the more important timber-producing regions in Montana. The forests are among the most important natural resources in the survey area. They supply raw material for the major industries, provide recreational opportunities for many people, provide food and cover for many forms of wildlife and suitable understory grazing for livestock at lower elevations, maintain water quality, and form the backdrop for much of the outdoor beauty of the area. The survey area contains more State and private commercial forest land than any other county in Montana.

Fifty-three percent of the survey area is classified as commercial forest land. Forty-six percent of the commercial forest land is privately owned, and the remainder is publicly owned—47 percent by the Federal government and 7 percent by State and county governments.

The largest plywood mill in the Rocky Mountain area, with an annual output of 300 million square feet, is in the survey area. The survey area also has two particleboard plants that produce approximately 100 million square feet annually, a paper mill that produces approximately 600,000 tons, a log-home builder that produces about 500 houses per year, three post and pole operators, and a cedar mill.

The existing wood manufacturing capacity may exceed current forest growth rates. The application of intensive forest management practices, such as thinning, planting, sanitation, and control of competing vegetation, particularly on the most productive soils, can significantly increase tree growth rates and help to ensure a supply of wood for the manufacturing plants.

The most extensive forest types are Douglas-fir, ponderosa pine, lodgepole pine, western larch, subalpine fir, and Engelmann spruce. Other forest types of lesser extent are western white pine, western redcedar, grand fir, and whitebark pine. Western black cottonwood and quaking aspen are in small patches or stringers along streams or in other wetter areas.

Tree growth rates and the kinds of trees that grow vary among different types of soils in the survey area. Soil depth, chemistry, texture, and available water capacity, in combination with aspect, elevation, and precipitation, are the major factors that influence the kinds of trees that grow and the productivity of the tree species. The soils in forest areas range from shallow to very deep, from nongravelly to extremely gravelly, and from fine textured to coarse textured. Because of differences among the soils, as well as differences in climate, topography, and geology, the forests vary dramatically in composition and productivity.

Moving from the broad valley floor to the foothills and mountains, precipitation increases and temperatures generally become cooler. Aspect becomes a significant environmental factor as the topography becomes more rugged. On steep south- and west-facing mountain slopes at the lower elevations (below 4,500 to 5,000 feet), ponderosa pine and Douglas-fir dominate. Winkler, Wildgen, dry, Repp and Sharrott soils are the more extensive soils in this environment. Bunchgrass is a common understory species on these soils. In the more gently sloping landscape positions at the lower elevations and on the steeper, cooler north and east aspects at elevations below 4,500 feet, ponderosa pine and Douglas-fir are still the primary adapted tree species, but pinegrass, common snowberry, white spirea, mallow ninebark, Oregongrape, and kinnikinnick are the common understory species. The presence of these species indicates a cooler environment and more effective precipitation. The productivity of the overstory and understory plants is generally greater on these soils. Associated soils include Winkler, cool, Wildgen, and Trapps soils. The temperature regime associated with the soils in these two environments is "frigid," and the moisture regime is "ustic," as defined in "Soil Taxonomy" *(14).*

In areas where precipitation in relation to elevation is greatest, such as the Montana-Idaho divide and the head of the Swan River drainage, western larch, lodgepole pine, and grand fir are common forest overstory species along with Douglas-fir and ponderosa pine. Some areas also support western white pine and western redcedar. In addition to the understory plants listed for the cooler environment, blue huckleberry, common beargrass, and twinflower are common

species in this moister environment. Commonly associated soils include Tevis, Rumblecreek, Courville, Mitten, Winfall, and Jimlake soils. These soils generally occur on steep, north and east aspects below an elevation of 5,000 feet and on all aspects where the average annual precipitation exceeds about 25 inches annually. The temperature regime associated with the soils in this environment is "frigid," and the moisture regime is "udic," as defined in "Soil Taxonomy" *(14)*. The soils in this group generally produce the most overstory and understory vegetation in the survey area.

Holloway, Waldbillig, Felan, and Phillcher soils are in cool, moist environments on north and east aspects at an elevation above about 5,000 feet and on all aspects and slopes above about 5,500 feet. Western larch, Douglas-fir, lodgepole pine, subalpine fir, and Engelmann spruce are commonly associated with the Holloway, Waldbillig, and Felan soils at the lower elevations. Blue huckleberry, common beargrass, and twinflower frequently dominate the understory. At the higher elevations and in the areas of colder temperature, Holloway, Waldbillig, and Felan soils support lodgepole pine, Engelmann spruce, and subalpine fir as the common overstory species. Grouse whortleberry is conspicuous in the understory plant community along with blue huckleberry and common beargrass. In this setting, cool phases of the Holloway, Waldbillig, and Felan soils are mapped. The overstory and understory plant communities associated with the cool phases are significantly less productive than the regular phases of these soil series. The Phillcher series occurs only at the highest elevations, in nearly timberline conditions. In these areas, whitebark pine, stunted subalpine fir, and Engelmann spruce are significant species. These areas are generally considered noncommercial forest land. The temperature regime associated with these soils is "cryic," and the moisture regime is "udic," as defined in "Soil Taxonomy" *(14)*.

The tables "Forest Land Productivity" and "Forest Land Management" can be used by forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. Estimates of the productivity of the soils are based on published data *(1, 2, 5, 7, 8, 9, 10, 11)*.

Woodland Ordination System

The table "Forest Land Management" lists the ordination (woodland suitability) symbol for each soil. The ordination system is a nationwide uniform system of labeling soils or groups of soils that are similar in use and management. The primary factors evaluated in the woodland ordination system are productivity of the forest overstory tree species and the principal soil properties resulting in hazards and limitations that affect forest management. There are three parts of the ordination system—class, subclass, and group. The class and subclass are referred to as the ordination symbol.

Ordination Class Symbol

The first element of the ordination symbol is a number that denotes potential productivity in terms of cubic meters of wood per hectare per year for the indicator tree species. The larger the number, the greater the potential productivity. Potential productivity is based on site index and the corresponding culmination of mean annual increment. For example, the number 1 indicates a potential production of 1 cubic meter of wood per hectare per year (14.3 cubic feet per acre per year) and 10 indicates a potential production of 10 cubic meters of wood per hectare per year (143 cubic feet per acre per year).

Indicator species is a species that is common in the area and is generally, but not necessarily, the most productive on the soil. It is the species that determines the ordination class. It is the first species listed for a particular map unit in the table "Forest Land Productivity." This table shows the productivity for all species where data have been collected.

Site index is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The site indexes shown in the table "Forest Land Productivity" are averages based on measurements made at sites that are representative of the soil series. When the site index and forest land productivity of different soils are compared, the values for the same tree species should be compared. The higher the site index number, the more productive the soil for that species. Site index values are used in conjunction with yield tables to determine average annual yields. Indirectly, they are used to determine the productivity class in the ordination class symbol.

Ordination Subclass Symbol

The second element of the ordination symbol, or subclass, is a capital letter that indicates certain soil or physiographic characteristics that contribute to important hazards or limitations to be considered in management. The subclasses are defined as follows:

Subclass X indicates that forest land use and management are limited by stones or rocks.

Subclass W indicates that forest land use and management are significantly limited by excess water, either seasonally or throughout the year. Restricted drainage, a high water table, or flooding can adversely affect either stand development or management.

Subclass T indicates that the root zone has toxic substances. Excessive alkalinity, acidity, sodium salts, or other toxic substances impede the development of desirable species.

Subclass D indicates that forest land use and management are limited by a restricted rooting depth. The rooting depth is restricted by hard bedrock, a hardpan, or other restrictive layers in the soil.

Subclass C indicates that forest land use and management are limited by the kind or amount of clay in the upper part of the soil.

Subclass S indicates that the soil is sandy, has a low available water capacity, and normally has a low content of available plant nutrients. The use of equipment is limited during dry periods.

Subclass F indicates that forest land use and management are limited by a high content of rock fragments that are larger than 2 millimeters and smaller than 10 inches. This subclass includes flaggy soils.

Subclass R indicates that forest land use and management are limited by excessive slope.

Subclass A indicates that no significant limitations affect forest land use and management.

Forest Land Management and Productivity

Information about the productivity and management of the forested map units in the survey area is given in the tables "Forest Land Management" and "Forest Land Productivity."

Management Concerns

In the table "Forest Land Management," the soils are rated for the erosion hazard, the equipment limitation, seedling mortality, the windthrow hazard, and plant competition.

The *erosion hazard* is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive management or special equipment and methods are needed to prevent excessive soil loss.

The *equipment limitation* is *slight* if the use of equipment is not limited to a particular kind of equipment or time of year; *moderate* if there is a short seasonal limitation or a need for some modification in the management of equipment; and *severe* if there is a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings are for seedlings that are from a good planting stock and that are properly planted during a period of average rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Windthrow hazard is *slight* if trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate* if some trees are blown down during periods of excessive soil wetness and strong winds; and *severe* if many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Plant competition is *slight* if there is little or no competition from other plants; *moderate* if plant competition is expected to hinder the development of a fully stocked stand of desirable trees; and *severe* if plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

Potential Productivity

The potential productivity of merchantable or *common trees* is expressed as a site index, which is described under the heading "Ordination Class Symbol." Commonly grown trees are those that forest land managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The column *trees that stands are commonly managed for* in the table "Forest Land Productivity" lists trees that are suitable for commercial wood production and that are suited to the soils.

Forest Access Road Limitations and Hazards

The major management concerns affecting the use of the detailed soil map units in the survey area for forest access roads are listed in the table "Main Forest Access Road Limitations and Hazards." The significance of each limitation or hazard and the criteria used to determine the limitation or hazard are described in this section.

Areas of rock outcrop and *depth to bedrock* can increase the cost of road construction and influence route planning. Constructing the roads is difficult because of the need for rock removal and for additional soil material to provide a suitable road surface.

Boulders increase the cost of road construction and influence route planning. Construction is difficult mainly because of the need for extraction and disposal of the boulders.

Dustiness of the road surface material may cause

safety problems and accelerate equipment wear. Dust-abatement measures are needed during dry periods.

The erodibility of the soil material in the roadbed influences the probability of *erosion by water* resulting from the channeling of runoff in the roadway. Erosion can result in the sedimentation of streams. It can be controlled by reducing road grades and controlling runoff onto and off of the road surface through the installation of drainage measures.

Flooding in the area where a road is constructed may restrict use, result in damage to the roadway, and result in the sedimentation of waterways. The hazard of flooding can be reduced by installing a drainage system, elevating the roadbed, and using riprap and diversions.

Low soil strength of the soil material used to construct the road surface can result in rutting, in drainage problems, and in poor trafficability during wet periods. The road should be used only during dry periods or when the surface is frozen. Surfacing with material of suitable strength and installing a drainage system can help to overcome this limitation.

Roadbed material that has a high *shrink-swell potential* shrinks and swells markedly during dry and wet periods. Excessive shrinking and swelling can damage the road surface or other features, such as bridge abutments, culverts, and erosion-control structures.

A steep *slope* results in increased construction and maintenance costs and increased sedimentation because of the large cuts necessary to create an adequate roadbed. Seeding the cut slope to suitable vegetation minimizes sedimentation. Large cuts can increase instability of the slope. Where slumping is a hazard, slope failure can become a significant maintenance and environmental problem. Areas where the slope is steep should not be used as sites for roads.

Slumping causes safety problems and increases maintenance costs. Frequent clearing of slumped soil in the roadbed or rebuilding of the roadway may be needed to keep the road serviceable and drainage systems functioning.

Stones cause problems in maintaining a smooth road surface that has good trafficability. Unless the stones are removed, additions of suitable stone-free material may be needed when the road is surfaced.

Roads built across soils that have a *water table* may require substantial ballast, fabric, internal drainage systems, and other measures that maintain a road surface that has good trafficability. Construction and use of the road only during periods when the water table is not near the surface or when the road is frozen help to maintain trafficability and reduce the potential for site damage.

Following is an explanation of the criteria used to determine the limitations or hazards.

Areas of rock outcrop.—Rock outcrop is a named component of the map unit.

Areas of rubble land.—Rubble land is a named component of the map unit.

Boulders.—The terms describing the texture within a depth of 24 inches include a bouldery modifier, or the soil is a bouldery phase.

Depth to rock.—Hard bedrock is within a depth of 60 inches.

Dustiness.—The surface layer is silt, silt loam, loam, or very fine sandy loam.

Erosion by water.—The surface K factor multiplied by the upper slope limit is more than 10.

Flooding.—The component of the map unit is occasionally flooded or frequently flooded.

Low soil strength.—The component of the map unit has one of the following Unified classifications within the 60-inch profile: ML, CL, MH, CH, OL, PT, or GC.

Shrink-swell potential.—The component of the map unit has a high shrink-swell potential in a layer that is at least 10 inches thick and is within 40 inches of the surface.

Slope.—The upper slope limit is more than 35 percent.

Slumping.—The component of the map unit meets the requirements for low soil strength and has slopes of more than 35 percent.

Stones.—The terms describing the texture within a depth of 24 inches include a very stony or extremely stony modifier, or the soil is a very stony or extremely stony phase.

Water table.—The component of the map unit has a water table within a depth of 60 inches.

FOREST LAND MANAGEMENT

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available)

Map symbol and soil name	Ordi- nation symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
2:						
Ambrant	4S	---	Moderate	Severe	Slight	Severe
3:						
Ambrant	4R	---	Severe	Severe	Slight	Severe
Rochester	4R	---	Severe	Severe	Slight	Severe
Rock outcrop.						
11:						
Auggie	6C	---	Moderate	Moderate	Moderate	Severe
12:						
Bata	3A	---	Slight	Slight	Moderate	Moderate
13:						
Bata	5A	---	Slight	Slight	Moderate	Moderate
Waldbillig	6A	---	Slight	Slight	Moderate	Moderate
14:						
Beeskove	5R	---	Severe	Moderate	Slight	Moderate
15:						
Beeskove	5R	---	Severe	Moderate	Slight	Moderate
Rock outcrop.						
23:						
Bignell	5A	---	Slight	Moderate	Slight	Severe
24:						
Bignell	5R	---	Severe	Moderate	Slight	Severe
Winkler	6R	---	Severe	Severe	Slight	Severe
25:						
Bignell	4R	---	Severe	Severe	Slight	Severe
Winkler	4R	---	Severe	Severe	Slight	Severe
27:						
Chickaman	7C	---	Moderate	Slight	Moderate	Moderate
28:						
Chickaman	7R	---	Severe	Slight	Moderate	Moderate
29:						
Coerock	2R	---	Moderate	Moderate	Severe	Moderate
Rock outcrop.						
30:						
Coerock	2D	---	Severe	Moderate	Severe	Moderate

FOREST LAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
31:						
Courville	6A	---	Slight	Moderate	Slight	Severe
32:						
Courville	6R	---	Severe	Moderate	Slight	Severe
Mitten	5R	---	Severe	Moderate	Moderate	Severe
33:						
Crow	6C	---	Moderate	Slight	Slight	Moderate
35:						
Elkner	5S	---	Moderate	Slight	Moderate	Severe
Ovando	5S	---	Moderate	Slight	Moderate	Severe
36:						
Evaro	5A	---	Slight	Moderate	Slight	Moderate
37:						
Evaro	5R	---	Severe	Moderate	Slight	Moderate
38:						
Felan	7A	---	Slight	Slight	Moderate	Moderate
39:						
Felan	7R	---	Severe	Slight	Moderate	Moderate
40:						
Felan	4A	---	Slight	Slight	Moderate	Moderate
41:						
Felan	4R	---	Severe	Slight	Moderate	Moderate
42:						
Glaciercreek	6F	---	Moderate	Moderate	Slight	Moderate
43:						
Glaciercreek variant	6F	---	Moderate	Moderate	Slight	Moderate
Glaciercreek	6F	---	Moderate	Moderate	Slight	Moderate
49:						
Greenough	5C	---	Moderate	Moderate	Slight	Severe
50:						
Hagstadt	4D	---	Moderate	Moderate	Severe	Slight
51:						
Half Moon	6C	---	Moderate	Moderate	Slight	Severe
53:						
Hollandlake	5A	---	Slight	Slight	Moderate	Moderate
54:						
Hollandlake	5A	---	Slight	Slight	Moderate	Moderate
Bata	5A	---	Slight	Slight	Moderate	Moderate
55:						
Hollandlake	5R	---	Severe	Slight	Moderate	Moderate

FOREST LAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
55:						
Bata	5R	---	Severe	Slight	Moderate	Moderate
56:						
Holloway	5A	---	Slight	Slight	Moderate	Moderate
57:						
Holloway	5R	---	Severe	Slight	Moderate	Moderate
58:						
Holloway	4A	---	Slight	Slight	Moderate	Moderate
59:						
Holloway	4R	---	Severe	Slight	Moderate	Moderate
60:						
Holloway	5R	---	Severe	Slight	Moderate	Moderate
Rock outcrop.						
61:						
Jimlake	7R	---	Moderate	Slight	Moderate	Moderate
62:						
Jimlake	7R	---	Severe	Slight	Moderate	Moderate
63:						
Lantern	6C	---	Moderate	Moderate	Moderate	Severe
64:						
Lantern	6R	---	Severe	Moderate	Moderate	Severe
65:						
Lantern	6R	---	Severe	Moderate	Moderate	Severe
Rock outcrop.						
66:						
Lolopeak	2R	---	Severe	Moderate	Moderate	Moderate
67:						
Lolopeak	2R	---	Severe	Moderate	Moderate	Moderate
Rock outcrop.						
68:						
Lubrecht	5C	---	Moderate	Slight	Slight	Moderate
69:						
Mitten	5R	---	Severe	Moderate	Moderate	Severe
70:						
Mitten	5R	---	Moderate	Moderate	Moderate	Severe
Sharrott	4D	---	Severe	Severe	Slight	Severe
71:						
Mitten	5R	---	Severe	Moderate	Moderate	Severe
Tevis	5R	---	Severe	Moderate	Slight	Severe

FOREST LAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
74:						
Ovando	5R	---	Severe	Slight	Moderate	Severe
Elkner	5R	---	Severe	Slight	Moderate	Severe
Rock outcrop.						
80:						
Petty	6S	---	Moderate	Slight	Moderate	Moderate
81:						
Petty	6R	---	Severe	Slight	Moderate	Moderate
82:						
Petty	6R	---	Severe	Slight	Moderate	Moderate
83:						
Petty	7S	---	Severe	Slight	Moderate	Moderate
84:						
Petty	7R	---	Severe	Slight	Moderate	Moderate
85:						
Petty	7R	---	Severe	Slight	Moderate	Moderate
Rock outcrop.						
86:						
Phillcher	2A	---	Slight	Slight	Moderate	Moderate
87:						
Phillcher	2R	---	Severe	Slight	Moderate	Moderate
Rock outcrop.						
89:						
Repp	4R	---	Severe	Severe	Slight	Severe
90:						
Repp	6A	---	Slight	Severe	Slight	Severe
91:						
Repp	6R	---	Severe	Severe	Slight	Severe
92:						
Repp	4R	---	Severe	Severe	Slight	Severe
Rock outcrop.						
95:						
Rumblecreek	7A	---	Slight	Moderate	Slight	Severe
96:						
Selway	5S	---	Moderate	Moderate	Slight	Severe
97:						
Selway	5R	---	Severe	Moderate	Slight	Severe
98:						
Selway	5R	---	Severe	Moderate	Slight	Severe

FOREST LAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
99:						
Sharrott	3D	---	Slight	Severe	Slight	Severe
Rock outcrop.						
100:						
Shooflin	6C	---	Moderate	Slight	Slight	Moderate
102:						
Tevis	6R	---	Severe	Moderate	Slight	Severe
103:						
Tevis	6A	---	Slight	Moderate	Slight	Severe
Mitten	6A	---	Slight	Moderate	Moderate	Severe
104:						
Tevis	6R	---	Severe	Moderate	Slight	Severe
Mitten	6R	---	Severe	Moderate	Moderate	Severe
Rock outcrop.						
105:						
Totelake	5F	---	Moderate	Severe	Slight	Severe
106:						
Totelake	5F	---	Moderate	Severe	Slight	Severe
107:						
Totelake	5X	---	Moderate	Severe	Slight	Severe
108:						
Trapps	5A	---	Slight	Moderate	Slight	Severe
109:						
Trapps	5R	---	Severe	Moderate	Slight	Severe
112:						
Udorthents.						
Glaciercreek	6F	---	Moderate	Moderate	Slight	Moderate
113:						
Upsata	6F	Slight	Moderate	Moderate	Moderate	Severe
115:						
Waldbillig	6A	---	Slight	Slight	Moderate	Moderate
116:						
Waldbillig	6R	---	Severe	Slight	Moderate	Moderate
117:						
Waldbillig	6A	---	Slight	Slight	Moderate	Moderate
Auggie	6C	---	Moderate	Moderate	Moderate	Severe
118:						
Waldbillig	6A	---	Slight	Slight	Moderate	Moderate

FORCE LAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
119:						
Waldbillig------------	6R	---	Severe	Slight	Moderate	Moderate
Holloway--------------	5R	---	Severe	Slight	Moderate	Moderate
120:						
Waldbillig------------	4A	---	Slight	Slight	Moderate	Moderate
Holloway--------------	4A	---	Slight	Slight	Moderate	Moderate
121:						
Waldbillig------------	4R	---	Severe	Slight	Moderate	Moderate
Holloway--------------	4R	---	Severe	Slight	Moderate	Moderate
122:						
Whitore---------------	5A	---	Slight	Moderate	Slight	Severe
123:						
Whitore---------------	5R	---	Severe	Moderate	Slight	Severe
124:						
Wildgen---------------	6A	---	Slight	Severe	Slight	Severe
125:						
Wildgen---------------	6A	---	Slight	Severe	Slight	Severe
Winkler---------------	6A	---	Slight	Severe	Slight	Severe
126:						
Wildgen---------------	6R	---	Severe	Severe	Slight	Severe
Winkler---------------	6R	---	Severe	Severe	Slight	Severe
127:						
Wildgen---------------	4A	---	Slight	Severe	Slight	Severe
Winkler---------------	4A	---	Slight	Severe	Slight	Severe
128:						
Wildgen---------------	4R	---	Severe	Severe	Slight	Severe
Winkler---------------	4R	---	Severe	Severe	Slight	Severe
129:						
Winfall---------------	6A	---	Slight	Moderate	Slight	Severe
130:						
Winkler---------------	4A	---	Slight	Severe	Slight	Severe
131:						
Winkler---------------	4R	---	Severe	Severe	Slight	Severe
132:						
Winkler---------------	6A	---	Slight	Severe	Slight	Severe
133:						
Winkler---------------	6R	---	Severe	Severe	Slight	Severe

FOREST LAND MANAGEMENT--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
134:						
Winkler----------------	4R	---	Severe	Severe	Slight	Severe
Rubble land.						
135:						
Winkler----------------	6R	---	Severe	Severe	Slight	Severe
Rock outcrop.						
137:						
Yourame----------------	6A	---	Slight	Severe	Slight	Severe

FOREST LAND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available)

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
2:						
Ambrant	Douglas-fir	45	4	196	60	Ponderosa pine, Douglas-fir
	Ponderosa pine	74	4	198	60	
3:						
Ambrant	Douglas-fir	45	4	196	60	Ponderosa pine, Douglas-fir
	Ponderosa pine	74	4	198	60	
Rochester	Douglas-fir	45	4	196	60	Ponderosa pine
	Ponderosa pine	74	4	198	60	
Rock outcrop.						
11:						
Auggie	Douglas-fir	60	6	320	92	Western larch, lodgepole pine, Engelmann spruce, Douglas-fir
	Western larch	60	6	306	90	
	Lodgepole pine	96	6	411	85	
	Subalpine fir	---	---	---	---	
	Engelmann spruce	---	---	---	---	
12:						
Bata	Lodgepole pine	60	3	156	50	Lodgepole pine, Engelmann spruce
	Engelmann spruce	40	2	110	28	
	Subalpine fir	---	---	---	---	
13:						
Bata	Lodgepole pine	85	5	344	74	Western larch, lodgepole pine, Douglas-fir
	Western larch	49	4	212	65	
	Douglas-fir	46	4	203	62	
	Subalpine fir	---	---	---	---	
Waldbillig	Douglas-fir	59	6	309	90	Western larch, lodgepole pine, Douglas-fir
	Lodgepole pine	81	5	309	70	
	Western larch	46	4	189	60	
	Subalpine fir	---	---	---	---	
14:						
Beeskove	Douglas-fir	55	5	266	81	Western larch, ponderosa pine, Douglas-fir
	Ponderosa pine	75	4	203	62	
	Western larch	47	4	197	61	
	Lodgepole pine	70	4	219	59	
15:						
Beeskove	Douglas-fir	55	5	266	81	Western larch, ponderosa pine, Douglas-fir
	Ponderosa pine	75	4	203	62	
	Western larch	47	4	197	61	
	Lodgepole pine	70	4	219	59	
Rock outcrop.						
23:						
Bignell	Douglas-fir	52	5	244	74	Western larch, ponderosa pine, Douglas-fir
	Ponderosa pine	80	5	232	69	
	Western larch	47	4	197	61	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
24:						
Bignell----------	Douglas-fir-------------	52	5	244	74	Western larch,
	Ponderosa pine----------	80	5	232	69	ponderosa pine,
	Western larch-----------	47	4	197	61	Douglas-fir
	Lodgepole pine----------	---	---	---	---	
Winkler----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine,
	Ponderosa pine----------	75	4	203	62	Douglas-fir
25:						
Bignell----------	Douglas-fir-------------	47	4	210	64	Ponderosa pine,
	Ponderosa pine----------	74	4	198	60	Douglas-fir
Winkler----------	Douglas-fir-------------	45	4	196	60	Douglas-fir
	Ponderosa pine----------	64	3	147	50	
27:						
Chickaman--------	Engelmann spruce--------	96	7	450	100	Western larch,
	Douglas-fir-------------	60	6	320	92	Engelmann spruce,
	Western larch-----------	61	6	317	92	Douglas-fir
	Lodgepole pine----------	90	5	380	79	
	Subalpine fir-----------	---	---	---	---	
28:						
Chickaman--------	Engelmann spruce--------	96	7	450	100	Western larch,
	Douglas-fir-------------	60	6	320	92	Engelmann spruce,
	Western larch-----------	61	6	317	92	Douglas-fir
	Lodgepole pine----------	90	5	380	79	
	Subalpine fir-----------	---	---	---	---	
29:						
Coerock----------	Subalpine fir-----------	---	---	---	---	Lodgepole pine,
	Whitebark pine----------	---	---	---	---	Engelmann spruce
	Engelmann spruce--------	---	---	---	---	
	Lodgepole pine----------	---	---	---	---	
Rock outcrop.						
30:						
Coerock----------	Engelmann spruce--------	40	2	110	28	Lodgepole pine,
	Subalpine fir-----------	---	---	---	---	Engelmann spruce
	Whitebark pine----------	35	---	---	---	
	Lodgepole pine----------	35	---	---	---	
Rock outcrop.						
31:						
Courville--------	Douglas-fir-------------	58	6	298	88	Ponderosa pine,
	Ponderosa pine----------	88	6	291	82	Douglas-fir
	Western larch-----------	52	5	235	71	
	Lodgepole pine----------	70	4	219	59	
32:						
Courville--------	Douglas-fir-------------	58	6	298	88	Ponderosa pine,
	Ponderosa pine----------	88	6	291	82	Douglas-fir
	Western larch-----------	52	5	235	71	
	Lodgepole pine----------	70	4	219	59	
Mitten-----------	Douglas-fir-------------	56	6	277	83	Western larch,
	Ponderosa pine----------	85	5	268	77	Douglas-fir
	Western larch-----------	52	5	235	71	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
33:						
Crow	Ponderosa pine	93	6	330	90	Ponderosa pine, Douglas-fir
	Douglas-fir	54	5	259	79	
	Western larch	47	4	197	61	
35:						
Elkner	Douglas-fir	51	5	237	71	Western larch, Douglas-fir
	Lodgepole pine	75	4	259	64	
	Western larch	42	4	166	53	
	Subalpine fir	---	---	---	---	
35:						
Ovando	Douglas-fir	51	5	237	71	Western larch, Douglas-fir
	Lodgepole pine	75	4	259	64	
	Western larch	42	4	166	53	
	Subalpine fir	---	---	---	---	
36:						
Evaro	Lodgepole pine	78	5	284	67	Lodgepole pine
	Douglas-fir	45	4	196	60	
	Western larch	45	4	182	58	
	Subalpine fir	---	---	---	---	
37:						
Evaro	Lodgepole pine	78	5	284	67	Lodgepole pine
	Douglas-fir	45	4	196	60	
	Western larch	45	4	182	58	
	Subalpine fir	---	---	---	---	
38:						
Felan	Douglas-fir	65	7	377	101	Western larch, Engelmann spruce, Douglas-fir
	Western larch	55	5	260	78	
	Lodgepole pine	80	5	300	69	
	Subalpine fir	---	---	---	---	
	Engelmann spruce	---	---	---	---	
39:						
Felan	Douglas-fir	65	7	377	101	Western larch, Engelmann spruce, Douglas-fir
	Western larch	55	5	260	78	
	Lodgepole pine	80	5	300	69	
	Subalpine fir	---	---	---	---	
	Engelmann spruce	---	---	---	---	
40:						
Felan	Engelmann spruce	68	4	261	60	Lodgepole pine, Engelmann spruce
	Lodgepole pine	60	3	156	50	
	Subalpine fir	---	---	---	---	
	Whitebark pine	---	---	---	---	
41:						
Felan	Engelmann spruce	68	4	261	60	Lodgepole pine, Engelmann spruce
	Lodgepole pine	60	3	156	50	
	Subalpine fir	---	---	---	---	
	Whitebark pine	---	---	---	---	
42:						
Glaciercreek	Ponderosa pine	88	6	291	82	Ponderosa pine
	Douglas-fir	54	5	259	79	
	Lodgepole pine	70	4	219	59	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
43:						
Glaciercreek variant	Ponderosa pine	88	6	291	82	Ponderosa pine
	Douglas-fir	54	5	259	79	
Glaciercreek	Ponderosa pine	88	6	291	82	Ponderosa pine
	Douglas-fir	54	5	259	79	
49:						
Greenough	Ponderosa pine	86	5	276	78	Western larch, ponderosa pine, Douglas-fir
	Douglas-fir	46	4	203	62	
	Western larch	---	---	---	---	
50:						
Hagstadt	Douglas-fir	45	4	196	60	Ponderosa pine, Douglas-fir
	Ponderosa pine	74	4	198	60	
51:						
Half Moon	Douglas-fir	60	6	320	92	Ponderosa pine, Douglas-fir
	Ponderosa pine	86	5	276	78	
53:						
Hollandlake	Lodgepole pine	85	5	344	74	Western larch, lodgepole pine, Douglas-fir
	Western larch	49	4	212	65	
	Douglas-fir	46	4	203	62	
	Grand fir	---	---	---	---	
	Subalpine fir	---	---	---	---	
54:						
Hollandlake	Lodgepole pine	85	5	344	74	Western larch, lodgepole pine, Douglas-fir
	Western larch	49	4	212	65	
	Douglas-fir	46	4	203	62	
	Grand fir	---	---	---	---	
	Subalpine fir	---	---	---	---	
Bata	Lodgepole pine	85	5	344	74	Western larch, lodgepole pine, Douglas-fir
	Western larch	49	4	212	65	
	Douglas-fir	46	4	203	62	
	Subalpine fir	---	---	---	---	
55:						
Hollandlake	Lodgepole pine	85	5	344	74	Western larch, lodgepole pine, Douglas-fir
	Western larch	49	4	212	65	
	Douglas-fir	46	4	203	62	
	Subalpine fir	---	---	---	---	
Bata	Lodgepole pine	85	5	344	74	Western larch, lodgepole pine, Douglas-fir
	Western larch	49	4	212	65	
	Douglas-fir	46	4	203	62	
	Subalpine fir	---	---	---	---	
56:						
Holloway	Douglas-fir	52	5	244	74	Western larch, Douglas-fir
	Lodgepole pine	75	4	259	64	
	Western larch	47	4	197	61	
57:						
Holloway	Douglas-fir	52	5	244	74	Western larch, Douglas-fir
	Lodgepole pine	75	4	259	64	
	Western larch	47	4	197	61	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
58:						
Holloway	Engelmann spruce	62	4	226	52	Lodgepole pine, Engelmann spruce
	Lodgepole pine	60	3	156	50	
	Subalpine fir	---	---	---	---	
59:						
Holloway	Engelmann spruce	62	4	226	52	Lodgepole pine, Engelmann spruce
	Lodgepole pine	60	3	156	50	
	Subalpine fir	---	---	---	---	
60:						
Holloway	Douglas-fir	52	5	244	74	Western larch, Douglas-fir
	Lodgepole pine	75	4	259	64	
	Western larch	47	4	197	61	
Rock outcrop.						
61:						
Jimlake	Engelmann spruce	94	7	435	97	Western larch, Engelmann spruce, western white pine, Douglas-fir
	Douglas-fir	55	5	266	81	
	Lodgepole pine	90	5	380	79	
	Western larch	55	5	260	78	
	Grand fir	---	---	---	---	
	Subalpine fir	---	---	---	---	
	Western redcedar	---	---	---	---	
	Western white pine	55	---	---	---	
62:						
Jimlake	Engelmann spruce	94	7	435	97	Western larch, Engelmann spruce, western white pine, Douglas-fir
	Douglas-fir	55	5	266	81	
	Lodgepole pine	90	5	380	79	
	Western larch	55	5	260	78	
	Grand fir	---	---	---	---	
	Subalpine fir	---	---	---	---	
	Western redcedar	---	---	---	---	
	Western white pine	55	---	---	---	
63:						
Lantern	Western larch	59	6	297	87	Western larch, Douglas-fir
	Douglas-fir	57	6	288	85	
	Lodgepole pine	90	5	380	79	
	Ponderosa pine	80	5	232	69	
64:						
Lantern	Western larch	59	6	297	87	Western larch, Douglas-fir
	Douglas-fir	57	6	288	85	
	Lodgepole pine	90	5	380	79	
	Ponderosa pine	80	5	232	69	
65:						
Lantern	Western larch	59	6	297	87	Western larch, Douglas-fir
	Douglas-fir	57	6	288	85	
	Lodgepole pine	90	5	380	79	
	Ponderosa pine	80	5	232	69	
Rock outcrop.						
66:						
Lolopeak	Lodgepole pine	---	---	---	---	Engelmann spruce
	Subalpine fir	---	---	---	---	
	Whitebark pine	---	---	---	---	
	Engelmann spruce	---	---	---	---	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
67:						
Lolopeak----------	Lodgepole pine----------	---	---	---	---	Engelmann spruce
	Subalpine fir-----------	---	---	---	---	
	Whitebark pine----------	---	---	---	---	
	Engelmann spruce--------	---	---	---	---	
Rock outcrop.						
68:						
Lubrecht----------	Douglas-fir-------------	54	5	259	79	Ponderosa pine, Douglas-fir
	Ponderosa pine----------	78	5	220	65	
69:						
Mitten-----------	Douglas-fir-------------	55	5	266	81	Western larch, Douglas-fir
	Ponderosa pine----------	85	5	268	77	
	Western larch-----------	52	5	235	71	
	Lodgepole pine----------	75	4	259	64	
70:						
Mitten-----------	Douglas-fir-------------	55	5	266	81	Western larch, Douglas-fir
	Ponderosa pine----------	85	5	268	77	
	Western larch-----------	52	5	235	71	
	Lodgepole pine----------	75	4	259	64	
Sharrott----------	Douglas-fir-------------	45	4	196	60	Douglas-fir
	Ponderosa pine----------	63	3	142	49	
71:						
Mitten-----------	Douglas-fir-------------	55	5	266	81	Western larch, Douglas-fir
	Ponderosa pine----------	85	5	268	77	
	Western larch-----------	52	5	235	71	
	Lodgepole pine----------	75	4	259	64	
Tevis------------	Douglas-fir-------------	55	5	266	81	Western larch, ponderosa pine, Douglas-fir
	Western larch-----------	50	5	219	67	
	Ponderosa pine----------	78	5	220	65	
	Lodgepole pine----------	70	4	219	59	
74:						
Ovando-----------	Douglas-fir-------------	51	5	237	71	Western larch, Douglas-fir
	Lodgepole pine----------	75	4	259	64	
	Western larch-----------	42	4	166	53	
	Subalpine fir-----------	---	---	---	---	
Elkner-----------	Douglas-fir-------------	51	5	237	71	Western larch, Douglas-fir
	Lodgepole pine----------	75	4	259	64	
	Western larch-----------	42	4	166	53	
	Subalpine fir-----------	---	---	---	---	
Rock outcrop.						
80:						
Petty------------	Douglas-fir-------------	60	6	320	92	Western larch, Engelmann spruce, Douglas-fir
	Lodgepole pine----------	90	5	380	79	
	Western larch-----------	55	5	260	78	
	Subalpine fir-----------	---	---	---	---	
	Engelmann spruce--------	---	---	---	---	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
81:						
Petty	Douglas-fir	60	6	320	92	Western larch, Engelmann spruce, Douglas-fir
	Lodgepole pine	90	5	380	79	
	Western larch	55	5	260	78	
	Subalpine fir	---	---	---	---	
	Engelmann spruce	---	---	---	---	
82:						
Petty	Douglas-fir	60	6	320	92	Western larch, Engelmann spruce, Douglas-fir
	Lodgepole pine	90	5	380	79	
	Western larch	55	5	260	78	
	Subalpine fir	---	---	---	---	
	Engelmann spruce	---	---	---	---	
83:						
Petty	Engelmann spruce	92	7	420	94	Engelmann spruce
	Lodgepole pine	80	5	300	69	
	Subalpine fir	---	---	---	---	
84:						
Petty	Engelmann spruce	92	7	420	94	Engelmann spruce
	Lodgepole pine	80	5	300	69	
	Subalpine fir	---	---	---	---	
85:						
Petty	Engelmann spruce	92	7	420	94	Engelmann spruce
	Lodgepole pine	80	5	300	69	
	Subalpine fir	---	---	---	---	
Rock outcrop.						
86:						
Phillcher	Lodgepole pine	---	---	---	---	Engelmann spruce
	Subalpine fir	---	---	---	---	
	Whitebark pine	---	---	---	---	
	Engelmann spruce	---	---	---	---	
87:						
Phillcher	Lodgepole pine	---	---	---	---	Engelmann spruce
	Subalpine fir	---	---	---	---	
	Whitebark pine	---	---	---	---	
	Engelmann spruce	---	---	---	---	
Rock outcrop.						
89:						
Repp	Douglas-fir	47	4	210	64	Douglas-fir
	Ponderosa pine	60	3	129	46	
90:						
Repp	Douglas-fir	57	6	288	85	Ponderosa pine, Douglas-fir
	Ponderosa pine	88	6	291	82	
91:						
Repp	Douglas-fir	57	6	288	85	Ponderosa pine, Douglas-fir
	Ponderosa pine	88	6	291	82	
92:						
Repp	Douglas-fir	47	4	210	64	Douglas-fir
	Ponderosa pine	60	3	129	46	
Rock outcrop.						

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
95:						
Rumblecreek	Ponderosa pine	96	7	352	96	Grand fir, lodgepole pine, ponderosa pine, Douglas-fir
	Douglas-fir	56	6	277	83	
	Lodgepole pine	86	5	351	75	
	Western larch	46	4	189	60	
	Grand fir	---	---	---	---	
96:						
Selway	Douglas-fir	50	5	230	69	Ponderosa pine, Douglas-fir
	Lodgepole pine	70	4	219	59	
	Ponderosa pine	73	4	193	59	
	Western larch	45	4	182	58	
97:						
Selway	Douglas-fir	50	5	230	69	Ponderosa pine, Douglas-fir
	Lodgepole pine	70	4	219	59	
	Ponderosa pine	73	4	193	59	
	Western larch	45	4	182	58	
98:						
Selway	Douglas-fir	50	5	230	69	Ponderosa pine, Douglas-fir
	Lodgepole pine	70	4	219	59	
	Ponderosa pine	73	4	193	59	
	Western larch	45	4	182	58	
99:						
Sharrott	Ponderosa pine	---	---	---	---	Ponderosa pine
Rock outcrop.						
100:						
Shooflin	Douglas-fir	58	6	298	88	Western larch, ponderosa pine, Douglas-fir
	Ponderosa pine	84	5	261	75	
	Western larch	50	5	219	67	
102:						
Tevis	Douglas-fir	56	6	277	83	Western larch, ponderosa pine, Douglas-fir
	Western larch	50	5	219	67	
	Ponderosa pine	78	5	220	65	
	Lodgepole pine	70	4	219	59	
103:						
Tevis	Douglas-fir	56	6	277	83	Western larch, ponderosa pine, Douglas-fir
	Western larch	50	5	219	67	
	Ponderosa pine	78	5	220	65	
	Lodgepole pine	70	4	219	59	
Mitten	Douglas-fir	56	6	277	83	Western larch, Douglas-fir
	Ponderosa pine	85	5	268	77	
	Western larch	52	5	235	71	
	Lodgepole pine	75	4	259	64	
104:						
Tevis	Douglas-fir	56	6	277	83	Western larch, ponderosa pine, Douglas-fir
	Western larch	50	5	219	67	
	Ponderosa pine	78	5	220	65	
	Lodgepole pine	70	4	219	59	
Mitten	Douglas-fir	56	6	277	83	Western larch, Douglas-fir
	Ponderosa pine	85	5	268	77	
	Western larch	52	5	235	71	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
104:						
Rock outcrop.						
105:						
Totelake	Douglas-fir	51	5	237	71	Ponderosa pine,
	Ponderosa pine	80	5	232	69	Douglas-fir
106:						
Totelake	Douglas-fir	51	5	237	71	Ponderosa pine,
	Ponderosa pine	80	5	232	69	Douglas-fir
107:						
Totelake	Douglas-fir	51	5	237	71	Ponderosa pine,
	Ponderosa pine	80	5	232	69	Douglas-fir
108:						
Trapps	Douglas-fir	50	5	230	69	Douglas-fir
	Ponderosa pine	75	4	203	62	
109:						
Trapps	Douglas-fir	50	5	230	69	Douglas-fir
	Ponderosa pine	75	4	203	62	
112:						
Udorthents.						
Glaciercreek	Ponderosa pine	88	6	291	82	Ponderosa pine
	Douglas-fir	54	5	259	79	
	Lodgepole pine	70	4	219	59	
113:						
Upsata	Engelmann spruce	88	6	389	88	Lodgepole pine,
	Lodgepole pine	70	4	219	59	Engelmann spruce,
	Western larch	45	4	182	58	Douglas-fir
	Subalpine fir	---	---	---	---	
	Douglas-fir	---	---	---	---	
115:						
Waldbillig	Douglas-fir	59	6	309	90	Western larch,
	Lodgepole pine	81	5	309	70	lodgepole pine,
	Western larch	46	4	189	60	Douglas-fir
	Subalpine fir	---	---	---	---	
116:						
Waldbillig	Douglas-fir	59	6	309	90	Western larch,
	Lodgepole pine	81	5	309	70	lodgepole pine,
	Western larch	46	4	189	60	Douglas-fir
	Subalpine fir	---	---	---	---	
117:						
Waldbillig	Douglas-fir	59	6	309	90	Western larch,
	Lodgepole pine	81	5	309	70	lodgepole pine,
	Western larch	46	4	189	60	Douglas-fir
	Engelmann spruce	---	---	---	---	
	Subalpine fir	---	---	---	---	
Auggie	Douglas-fir	60	6	320	92	Western larch,
	Western larch	60	6	306	90	lodgepole pine,
	Lodgepole pine	96	6	411	85	Engelmann spruce,
	Subalpine fir	---	---	---	---	Douglas-fir
	Engelmann spruce	---	---	---	---	

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
118:						
Waldbillig-------	Douglas-fir-------------	59	6	309	90	Western larch,
	Lodgepole pine----------	81	5	309	70	lodgepole pine,
	Western larch-----------	46	4	189	60	Douglas-fir
	Subalpine fir-----------	---	---	---	---	
Holloway---------	Douglas-fir-------------	52	5	244	74	Western larch,
	Lodgepole pine----------	75	4	259	64	Douglas-fir
	Western larch-----------	47	4	197	61	
	Subalpine fir-----------	---	---	---	---	
119:						
Waldbillig-------	Douglas-fir-------------	59	6	309	90	Western larch,
	Lodgepole pine----------	81	5	309	70	lodgepole pine,
	Western larch-----------	46	4	189	60	Douglas-fir
	Subalpine fir-----------	---	---	---	---	
Holloway---------	Douglas-fir-------------	52	5	244	74	Western larch,
	Western larch-----------	52	5	235	71	Douglas-fir
	Lodgepole pine----------	75	4	259	64	
	Subalpine fir-----------	---	---	---	---	
120:						
Waldbillig-------	Engelmann spruce--------	62	4	226	52	Lodgepole pine,
	Lodgepole pine----------	60	3	156	50	Engelmann spruce
	Subalpine fir-----------	---	---	---	---	
Holloway---------	Engelmann spruce--------	62	4	226	52	Lodgepole pine,
	Lodgepole pine----------	60	3	156	50	Engelmann spruce
	Subalpine fir-----------	---	---	---	---	
121:						
Waldbillig-------	Engelmann spruce--------	62	4	226	52	Lodgepole pine,
	Lodgepole pine----------	60	3	156	50	Engelmann spruce
	Subalpine fir-----------	---	---	---	---	
Holloway---------	Engelmann spruce--------	62	4	226	52	Lodgepole pine,
	Lodgepole pine----------	60	3	156	50	Engelmann spruce
	Subalpine fir-----------	---	---	---	---	
122:						
Whitore----------	Douglas-fir-------------	50	5	230	69	Douglas-fir
123:						
Whitore----------	Douglas-fir-------------	50	5	230	69	Douglas-fir
124:						
Wildgen----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine,
	Ponderosa pine----------	79	5	226	67	Douglas-fir
125:						
Wildgen----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine,
	Ponderosa pine----------	79	5	226	67	Douglas-fir
Winkler----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine,
	Ponderosa pine----------	79	5	226	67	Douglas-fir
126:						
Wildgen----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine,
	Ponderosa pine----------	79	5	226	67	Douglas-fir

FOREST LAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Productivity class	Board feet	Cubic feet	Trees that stands are commonly managed for
127:						
Wildgen----------	Douglas-fir-------------	45	4	196	60	Ponderosa pine
	Ponderosa pine----------	64	3	147	50	
Winkler----------	Douglas-fir-------------	45	4	196	60	Douglas-fir
	Ponderosa pine----------	64	3	147	50	
128:						
Wildgen----------	Douglas-fir-------------	45	4	196	60	Ponderosa pine
	Ponderosa pine----------	64	3	147	50	
Winkler----------	Douglas-fir-------------	45	4	196	60	Douglas-fir
	Ponderosa pine----------	64	3	147	50	
129:						
Winfall----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine, Douglas-fir
	Ponderosa pine----------	85	5	268	77	
	Western larch-----------	52	5	235	71	
	Lodgepole pine----------	70	4	219	59	
130:						
Winkler----------	Douglas-fir-------------	45	4	196	60	Douglas-fir
	Ponderosa pine----------	64	3	147	50	
131:						
Winkler----------	Douglas-fir-------------	45	4	196	60	Douglas-fir
	Ponderosa pine----------	64	3	147	50	
132:						
Winkler----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine, Douglas-fir
	Ponderosa pine----------	75	4	203	62	
133:						
Winkler----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine, Douglas-fir
	Ponderosa pine----------	75	4	203	62	
134:						
Winkler----------	Douglas-fir-------------	45	4	196	60	Douglas-fir
	Ponderosa pine----------	64	3	147	50	
Rubble land.						
135:						
Winkler----------	Douglas-fir-------------	56	6	277	83	Ponderosa pine, Douglas-fir
	Ponderosa pine----------	75	4	203	62	
Rock outcrop.						
137:						
Yourame----------	Ponderosa pine----------	87	6	284	80	Ponderosa pine, Douglas-fir
	Douglas-fir-------------	53	5	252	76	

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS

(See text for a description of the limitations and hazards listed in this table)

Soil name and map symbol	Forest access road limitations or hazards
2:	
Ambrant	None
3:	
Ambrant	Areas of rock outcrop Slope
Rochester	Areas of rock outcrop Slope
Rock outcrop	Nonsoil material
11:	
Auggie	Dustiness Low soil strength
12:	
Bata	Dustiness Low soil strength
13:	
Bata	Dustiness Low soil strength
Waldbillig	Dustiness Low soil strength
14:	
Beeskove	Slope Water erosion
15:	
Beeskove	Areas of rock outcrop Slope Water erosion
Rock outcrop	Nonsoil material
23:	
Bignell	Low soil strength
24:	
Bignell	Low soil strength Slope Water erosion
Winkler	Slope
25:	
Bignell	Low soil strength Slope Water erosion
Winkler	Slope
27:	
Chickaman	Dustiness

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
28:	
Chickaman	Dustiness Low soil strength Slope Water erosion
29:	
Coerock	Areas of rock outcrop Depth to rock Dustiness
Rock outcrop	Nonsoil material
30:	
Coerock	Areas of rock outcrop Depth to rock Dustiness Slope
Rock outcrop	Nonsoil material
31:	
Courville	Dustiness Low soil strength
32:	
Courville	Dustiness Low soil strength Slope Water erosion
Mitten	Dustiness Slope
33:	
Crow	Dustiness Low soil strength Shrink swell potential
35:	
Elkner	None
Ovando	None
36:	
Evaro	Low soil strength
37:	
Evaro	Low soil strength Slope Water erosion
38:	
Felan	Dustiness Low soil strength
39:	
Felan	Dustiness Low soil strength Slope

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
40:	
Felan	Dustiness Low soil strength
41:	
Felan	Dustiness Low soil strength Slope
42:	
Glaciercreek	Dustiness
43:	
Glaciercreek variant	None
Glaciercreek	Dustiness
49:	
Greenough	Dustiness Low soil strength
50:	
Hagstadt	Dustiness Low soil strength
51:	
Half Moon	Dustiness Low soil strength
53:	
Hollandlake	Low soil strength
54:	
Hollandlake	Low soil strength
Bata	Dustiness Low soil strength
55:	
Hollandlake	Low soil strength Slope Water erosion
Bata	Dustiness Low soil strength Slope Water erosion
56:	
Holloway	Dustiness
57:	
Holloway	Dustiness Slope
58:	
Holloway	Dustiness
59:	
Holloway	Dustiness Slope

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
60:	
Holloway	Areas of rock outcrop Dustiness Slope Water erosion
Rock outcrop	Nonsoil material
61:	
Jimlake	Dustiness Low soil strength
62:	
Jimlake	Dustiness Low soil strength Slope Water erosion
63:	
Lantern	None
64:	
Lantern	Slope
65:	
Lantern	Areas of rock outcrop Slope
Rock outcrop	Nonsoil material
66:	
Lolopeak	Boulders Slope Stones
67:	
Lolopeak	Areas of rock outcrop Boulders Slope Stones
Rock outcrop	Nonsoil material
68:	
Lubrecht	Dustiness Low soil strength Shrink swell potential
69:	
Mitten	Dustiness Slope Water erosion
70:	
Mitten	Dustiness Slope
Sharrott	Depth to rock Low soil strength Slope

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
71:	
Mitten	Dustiness Slope Water erosion
Tevis	Slope Water erosion
74:	
Ovando	Areas of rock outcrop Slope
Elkner	Areas of rock outcrop Slope
Rock outcrop	Nonsoil material
80:	
Petty	None
81:	
Petty	Slope
82:	
Petty	Boulders Slope
83:	
Petty	None
84:	
Petty	Boulders Slope Water erosion
85:	
Petty	Areas of rock outcrop Boulders Slope Water erosion
Rock outcrop	Nonsoil material
86:	
Phillcher	Dustiness
87:	
Phillcher	Areas of rock outcrop Dustiness Slope Water erosion
Rock outcrop	Nonsoil material
89:	
Repp	Low soil strength Slope
90:	
Repp	Low soil strength

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
91:	
Repp	Low soil strength Slope
92:	
Repp	Areas of rock outcrop Low soil strength Slope
Rock outcrop	Nonsoil material
95:	
Rumblecreek	Low soil strength
96:	
Selway	None
97:	
Selway	Slope
98:	
Selway	Boulders Slope
99:	
Sharrott	Areas of rock outcrop Depth to rock Low soil strength
Rock outcrop	Nonsoil material
100:	
Shooflin	Dustiness Low soil strength Shrink swell potential
102:	
Tevis	Slope Water erosion
103:	
Tevis	None
Mitten	Dustiness
104:	
Tevis	Areas of rock outcrop Slope Water erosion
Mitten	Areas of rock outcrop Dustiness Slope Water erosion
Rock outcrop	Nonsoil material
105:	
Totelake	None
106:	
Totelake	None

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
107:	
Totelake	None
108:	
Trapps	Low soil strength
109:	
Trapps	Low soil strength Slope Water erosion
112:	
Udorthents	Onsite investigation required
Glaciercreek	Dustiness
113:	
Upsata	None
115:	
Waldbillig	Dustiness Low soil strength
116:	
Waldbillig	Dustiness Low soil strength Slope Water erosion
117:	
Waldbillig	Dustiness Low soil strength
Auggie	Dustiness Low soil strength
118:	
Waldbillig	Dustiness Low soil strength
Holloway	Dustiness
119:	
Waldbillig	Dustiness Low soil strength Slope Water erosion
Holloway	Dustiness Slope
120:	
Waldbillig	Dustiness Low soil strength
Holloway	Dustiness
121:	
Waldbillig	Dustiness Low soil strength Slope

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
121:	
Holloway	Dustiness Slope
122:	
Whitore	Low soil strength
123:	
Whitore	Low soil strength Slope Water erosion
124:	
Wildgen	Low soil strength
125:	
Wildgen	Low soil strength
Winkler	None
126:	
Wildgen	Low soil strength Slope
Winkler	Slope
127:	
Wildgen	Low soil strength
Winkler	None
128:	
Wildgen	Low soil strength Slope
Winkler	Slope
129:	
Winfall	Low soil strength
130:	
Winkler	None
131:	
Winkler	Slope
132:	
Winkler	None
133:	
Winkler	Slope
134:	
Winkler	Areas of rubble land Slope
Rubble land	Nonsoil material
135:	
Winkler	Areas of rock outcrop Slope Water erosion

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Forest access road limitations or hazards
135:	
Rock outcrop	Nonsoil material
137:	
Yourame	Low soil strength

Recreation

The soils of the survey area are rated in the table "Recreational Development" according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites, and either access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational uses by the duration of flooding and the season when it occurs. Onsite assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers and for outdoor activities that accompany such sites. These areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soils are rated on the basis of soil properties that influence the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and promote the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation after development. The surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Playgrounds are areas used intensively for baseball, football, or similar activities. These areas require a nearly level soil that is free of stones and that can withstand heavy foot traffic and maintain an adequate cover of vegetation. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns in developing playgrounds. The surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Paths and trails are areas used for hiking and horseback riding. The areas should require little or no cutting and filling during site preparation. The soils are rated on the basis of soil properties that influence trafficability and erodibility. Paths and trails should remain firm under foot traffic and not be dusty when dry.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

The interpretive ratings in this table help engineers, planners, and others to understand how soil properties influence recreational uses. Ratings for proposed uses are given in terms of limitations. Only the most restrictive features are listed. Other features may limit a specific recreational use.

The degree of soil limitation is expressed as slight, moderate, or severe.

Slight means that soil properties are favorable for the rated use. The limitations are minor and can be easily overcome. Good performance and low maintenance are expected.

Moderate means that soil properties are moderately favorable for the rated use. The limitations can be overcome or modified by special planning, design, or maintenance. During some part of the year, the expected performance may be less desirable than that of soils rated *slight*.

Severe means that soil properties are unfavorable for the rated use. Examples of limitations are slope,

bedrock near the surface, flooding, and a seasonal high water table. These limitations generally require major soil reclamation, special design, or intensive maintenance. Overcoming the limitations generally is difficult and costly.

The information in the table "Recreational Development" can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in the table "Building Site Development" and interpretations for septic tank absorption fields in the table "Sanitary Facilities."

RECREATIONAL DEVELOPMENT

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1:					
Alberton--------	Moderate: dusty	Moderate: dusty	Moderate: dusty	Moderate: dusty	Slight
2:					
Ambrant---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
3:					
Ambrant---------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Rochester-------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: droughty, slope
Rock outcrop.					
4:					
Aquic Haploxerolls.					
5:					
Aquic Udorthents.					
6:					
Aquolls.					
Aquepts.					
7:					
Argixerolls.					
Haploxerolls.					
8:					
Argixerolls.					
Haploxerolls.					
9:					
Argixerolls.					
Haploxerolls.					
10:					
Argixerolls.					
Haploxerolls.					
11:					
Auggie----------	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
12:					
Bata	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: small stones, large stones, droughty
13:					
Bata	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Waldbillig	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
14:					
Beeskove	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
15:					
Beeskove	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Rock outcrop.					
16:					
Bigarm	Moderate: small stones, dusty	Moderate: small stones, dusty	Severe: small stones	Moderate: dusty	Moderate: small stones, large stones, droughty
17:					
Bigarm	Moderate: slope, small stones, dusty	Moderate: slope, small stones, dusty	Severe: slope, small stones	Moderate: dusty	Moderate: small stones, large stones, droughty
18:					
Bigarm	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, dusty	Severe: slope
19:					
Bigarm	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
20:					
Bigarm	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Rock outcrop.					
21:					
Biglake	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Slight	Severe: droughty

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
22: Biglake	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: droughty, slope
23: Bignell	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
24: Bignell	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Winkler	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: small stones, droughty, slope
25: Bignell	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Winkler	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: small stones, slope
26: Borohemists.					
27: Chickaman	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
28: Chickaman	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
29: Coerock	Severe: slope, small stones, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope, small stones, depth to rock	Severe: small stones	Severe: small stones, slope, depth to rock
Rock outcrop.					
30: Coerock	Severe: slope, small stones, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope, small stones	Severe: small stones, slope, depth to rock
Rock outcrop.					
31: Courville	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
32:					
Courville	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Mitten	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
33:					
Crow	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: large stones, slope
34:					
Desmet	Moderate: dusty	Moderate: dusty	Moderate: dusty	Moderate: dusty	Slight
35:					
Elkner	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Ovando	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: droughty, slope
36:					
Evaro	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
37:					
Evaro	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
38:					
Felan	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
39:					
Felan	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
40:					
Felan	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
41:					
Felan	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
42:					
Glaciercreek	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: small stones, large stones, droughty

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
43:					
Glaciercreek variant	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Glaciercreek	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Slight	Moderate: small stones, large stones, droughty
44:					
Grantsdale	Moderate: dusty	Moderate: dusty	Moderate: dusty	Moderate: dusty	Slight
45:					
Grassvalley	Moderate: percs slowly	Moderate: percs slowly	Moderate: slope, percs slowly	Slight	Slight
46:					
Grassvalley	Moderate: percs slowly	Moderate: percs slowly	Severe: slope	Slight	Slight
47:					
Grassvalley	Moderate: slope, percs slowly	Moderate: slope, percs slowly	Severe: slope	Severe: erodes easily	Moderate: slope
48:					
Grassvalley	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
49:					
Greenough	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: large stones, slope
50:					
Hagstadt	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope, depth to rock
51:					
Half Moon	Slight	Slight	Severe: slope	Slight	Moderate: large stones
52:					
Hanaker	Slight	Slight	Moderate: slope	Slight	Slight
53:					
Hollandlake	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
54:					
Hollandlake	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Bata	Severe:	Severe:	Severe:	Moderate:	Severe:

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
55:					
Hollandlake-----	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Bata------------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
56:					
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
57:					
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
58:					
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
59:					
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
60:					
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Rock outcrop.					
61:					
Jimlake---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
62:					
Jimlake---------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
63:					
Lantern---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
64:					
Lantern---------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
65:					
Lantern---------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Rock outcrop.					

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
66:					
Lolopeak	Severe: slope	Severe: slope	Severe: large stones, slope, small stones	Severe: slope	Severe: droughty, slope
67:					
Lolopeak	Severe: slope	Severe: slope	Severe: large stones, slope, small stones	Severe: slope	Severe: droughty, slope
Rock outcrop.					
68:					
Lubrecht	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope, depth to rock
69:					
Mitten	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
70:					
Mitten	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Sharrott	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope	Severe: slope, depth to rock
71:					
Mitten	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Tevis	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: droughty, slope
72:					
Moiese	Moderate: small stones, dusty	Moderate: small stones, dusty	Severe: small stones	Moderate: dusty	Moderate: small stones, large stones, droughty
73:					
Orthents.					
74:					
Ovando	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: droughty, slope
Elkner	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.					

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
75:					
Perma-----------	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: small stones, large stones, droughty
76:					
Perma-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
77:					
Perma-----------	Moderate: small stones	Moderate: small stones	Severe: slope, small stones	Moderate: large stones	Moderate: small stones, large stones, droughty
78:					
Perma variant---	Slight	Slight	Moderate: large stones, slope, small stones	Slight	Moderate: large stones
79:					
Perma variant---	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Perma-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: large stones, slope	Severe: slope
80:					
Petty-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
81:					
Petty-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
82:					
Petty-----------	Severe: slope	Severe: slope	Severe: large stones, slope, small stones	Severe: slope	Severe: slope
83:					
Petty-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
84:					
Petty-----------	Severe: slope	Severe: slope	Severe: large stones, slope, small stones	Severe: slope	Severe: slope
85:					
Petty-----------	Severe: slope	Severe: slope	Severe: large stones, slope, small stones	Severe: slope	Severe: slope

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
85: Rock outcrop.					
86: Phillcher-------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
87: Phillcher-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.					
88: Pits.					
89: Repp------------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope	Severe: small stones, slope
90: Repp------------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Moderate: slope	Severe: small stones, slope
91: Repp------------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope	Severe: small stones, slope
92: Repp------------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope	Severe: small stones, slope
Rock outcrop.					
93: Riverwash.					
94: Rock outcrop.					
Rubble land.					
95: Rumblecreek-----	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
96: Selway----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
97: Selway----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
98:					
Selway----------	Severe: slope	Severe: slope	Severe: large stones, slope, small stones	Severe: slope	Severe: droughty, slope
99:					
Sharrott--------	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Moderate: slope	Severe: slope, depth to rock
Rock outcrop.					
100:					
Shooflin--------	Moderate: slope, percs slowly	Moderate: slope, percs slowly	Severe: slope	Severe: erodes easily	Moderate: large stones, slope
101:					
Tally variant---	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
102:					
Tevis-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: droughty, slope
103:					
Tevis-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: droughty, slope
Mitten----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
104:					
Tevis-----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: droughty, slope
Mitten----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Rock outcrop.					
105:					
Totelake--------	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: small stones, large stones, droughty
106:					
Totelake--------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
107:					
Totelake--------	Severe: large stones	Severe: large stones	Severe: large stones, small stones	Slight	Severe: droughty

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
108:					
Trapps----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
109:					
Trapps----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
110:					
Turrah----------	Severe: wetness	Moderate: wetness, percs slowly	Severe: wetness	Moderate: wetness	Moderate: wetness
111:					
Udifluvents.					
112:					
Udorthents.					
Glaciercreek----	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: small stones, large stones, droughty
113:					
Upsata----------	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Severe: droughty
114:					
Urban land.					
115:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
116:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
117:					
Waldbillig------	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Slight	Moderate: small stones, large stones, droughty
Auggie----------	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
118:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
119:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
120:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
121:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Holloway--------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
122:					
Whitore---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
123:					
Whitore---------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
124:					
Wildgen---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
125:					
Wildgen---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Winkler---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
126:					
Wildgen---------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Winkler---------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
127:					
Wildgen----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Winkler----------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: small stones	Severe: small stones, droughty, slope
128:					
Wildgen----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Winkler----------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: small stones, droughty, slope
129:					
Winfall----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
130:					
Winkler----------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: small stones	Severe: small stones, slope
131:					
Winkler----------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: small stones, slope
132:					
Winkler----------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
133:					
Winkler----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
134:					
Winkler----------	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: slope, small stones	Severe: small stones, slope
Rubble land.					
135:					
Winkler----------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Rock outcrop.					
136:					
Xerofluvents.					

RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
137:					
Yourame---------	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area.

If the soils have potential for habitat development, wildlife habitat can be created or improved by planting appropriate vegetation, properly managing the existing plant cover, and fostering the natural establishment of desirable plants.

Elements of Wildlife Habitat

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants used by wildlife. Examples are wheat, rye, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Examples are fescue, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, reed canarygrass, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, indiangrass, blueberry, goldenrod, lambsquarters, dandelions, blackberry, ragweed, wheatgrass, fescue, and nightshade.

The major soil properties affecting the growth of grain and forage crops and wild herbaceous plants are depth of the root zone, texture of the surface layer, the amount of water available to plants, wetness, salinity or sodicity, and flooding. The length of the growing season also is important.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage that wildlife eat. Examples are oak, poplar, boxelder, birch, maple, green ash, willow, and American elm. Examples of fruit-producing shrubs that are suitable for planting on soils that have good potential for these plants are hawthorn, honeysuckle, American plum, redosier dogwood, chokecherry, serviceberry, silver buffaloberry, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that provide habitat or supply food in the form of browse, seed, or fruitlike cones. Examples are pine, spruce, hemlock, fir, yew, cedar, larch, and juniper.

The major soil properties affecting the growth of hardwood and coniferous trees and shrubs are depth of the root zone, the amount of water available to plants, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Wetland plants produce food or cover for wetland wildlife. Examples of these plants are smartweed, wild millet, rushes, sedges, bulrushes, wild rice, arrowhead, waterplantain, pickerelweed, and cattail.

The major soil properties affecting wetland plants are texture of the surface layer, wetness, acidity or alkalinity, and slope.

Shallow water areas have an average depth of less than 5 feet. They are useful as habitat for some wildlife species. They are naturally wet areas or are created by dams, levees, or water-control measures in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability.

Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include Hungarian partridge, pheasant, sharp-tailed grouse, sage grouse, meadowlark, field sparrow, killdeer, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of hardwoods or conifers or a mixture of these and associated grasses, legumes, and wild herbaceous plants. The wildlife attracted to this habitat include wild

turkey, ruffed grouse, thrushes, woodpeckers, owls, tree squirrels, porcupine, raccoon, deer, elk, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow water areas that support water-tolerant plants. The wildlife attracted to this habitat include ducks, geese, herons, bitterns, rails, kingfishers, muskrat, otter, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. The wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

Wildlife in the Missoula County Area

The survey area provides a diversity of habitats for wildlife, including rangeland, coniferous forests, mountaineous areas that range from rolling foothills to glaciated peaks, riparian woodland, dry and irrigated cropland, streams and rivers, ponds, marshes, and reservoirs.

Moose are found in the areas drained by Glacier and Elk Creek in the upper Swan River Valley, in the area drained by Elk Creek southeast of Greenough, and in the northern Sapphire Mountains southeast of Missoula. They graze high-elevation spruce and fir forests in summer and fall and move along drainageways to winter ranges at the lower elevations as snow accumulates on the higher slopes. The moose are primarily browsers and feed on a variety of willows and other deciduous shrubs, especially during the winter. Forbs are an important part of their spring and summer diet.

Hunters consider the Rocky Mountain elk to be Montana's most prized big game animal. Elk are found in all the mountain ranges of the survey area. Elk habitats are classified as either grass or browse ranges based on the availability of winter food. Browse ranges predominate in the survey area. Elk spend their summers and falls at relatively high elevations, where moist, lush forests are interspersed with grassy mountain meadows. They begin to move to lower elevations late in fall, depending upon the amount of snowfall. In forested environments, elk thrive during the shrub stage of plant succession. Elk numbers are lower in areas where coniferous trees grow in old burns and clearcuts and replace browse and herbaceous plants. Elk prefer bunchgrass ranges, but they are adaptable and are also in timbered mountains and canyons.

Both white-tailed deer and mule deer are throughout the survey area. White-tailed deer generally inhabit the lower areas and valleys, stream bottoms, and foothills. Their winter ranges are along the Clark Fork, Bitterroot, Blackfoot, and Clearwater Rivers. Mule deer are throughout most of the survey area but are especially numerous at the mid and high elevations and along the foothills of major mountain ranges.

A modest population of bighorn sheep are along the Clark Fork River in the western part of the survey area. Mountain goats are in the rugged northern mountains of Missoula County outside the survey area.

Black bear are in a variety of forest habitats that range from mountain meadows to spruce and fir forests. They are most common in the mountain ranges in the survey area. Grizzly bear are known to be in the northern mountains of Missoula County, bordering the Swan River Valley. Except for built-up areas, habitat for bear is throughout the survey area.

Ring-necked pheasants and gray partridge reside in the bottom land in the Bitterroot and Clark Fork River Valleys, south and west of Missoula. These introduced birds are supported by varied land use patterns that include small grain, irrigated and dry cropland, annual forbs, and brushy cover.

Land management practices that are beneficial to pheasants and gray partridge include proper grazing use, protection of woody cover from burning or eradication, and the retention of stubble and waste grain during winter through elimination of fall tillage. Woody plantings, which include shelterbelts, field hedgerows, and plantings in cropland areas for the control of erosion, provide habitat for partridge, pheasants, and a variety of nongame birds. The major areas of bottom land provide habitat for ringneck pheasants. Such habitat includes irrigated and dry cropland, brushy ditchbanks, and brushy drainageways.

Merriams turkeys have been introduced to the survey area. They are commonly found in the foothills and bottom land of the Clark Fork, Bitterroot, and lower Blackfoot River Valleys. A few chukar partridge are in the foothills of the Sapphire Mountains south of Missoula. A small population of Columbian sharp-tailed grouse are in the Blackfoot River Valley in the eastern end of Missoula County.

Three species of forest-dwelling grouse—blue grouse, spruce grouse, and ruffed grouse—are common in the coniferous forests and riparian woodlands. A variety of habitats is important to forest grouse throughout the year.

Blue grouse winter at high elevations. In early spring they move to semi-open areas of timber at lower elevations for breeding and brood rearing. Ruffed grouse inhabit areas with a dense cover of mixed conifers and deciduous trees and shrubs. They are mostly along stream bottoms. Adult ruffed grouse may spend most of their lives in an area less than 2 square miles in size.

In Montana, the habitat for blue grouse is closely associated with the distribution pattern of true firs and

Douglas-fir as well as the soil associations that support these trees. The extent and quality of forest grouse habitat is largely determined by forest management practices, grazing, and fire. The brushy draws, stream bottoms, mixed forests, and grazeable woodlands throughout the survey area provide the major habitat for forest grouse.

Numerous marshes, ponds, and reservoirs throughout the survey area provide habitat for waterfowl during spring and fall migrations. Ducks, geese, and a variety of shore and marsh birds use these bodies of water for resting, nesting, and rearing of young.

Beaver, mink, muskrat, and raccoon are along the principal watercourses. Cottontail rabbits, badger, ground squirrels, coyotes, bobcats, and a variety of small mammals are throughout the survey area.

Populations of game and nongame species can be enhanced through application of conservation practices that improve habitat. These practices include the development of odd or irregularly shaped areas in and adjacent to farmland, protection of such areas from fire or grazing, and the establishment of woody vegetation that provides winter shelter. Wildlife habitat may also be enhanced through increased application of commonly employed conservation practices, including proper grazing, planned grazing systems, stripcropping, minimum tillage, field windbreaks, and the construction of ponds.

Excellent sport fishing is available in the rivers and streams of Missoula County. The Blackfoot, Swan, Clark Fork, and Bitterroot Rivers, for example, support a variety of game fish, including rainbow, brook, cutthroat, and brown trout. Numerous smaller streams, ponds, and reservoirs throughout the survey area provide abundant angling opportunities for sport fishermen.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

The table "Building Site Development" shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging,

filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

The table "Sanitary Facilities" shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. It also shows the suitability of the soils for use as a daily cover for landfill.

Soil properties are important in selecting sites for sanitary facilities and in identifying limiting soil properties and site features to be considered in planning, design, and installation. Soil limitation ratings of *slight, moderate,* or *severe* are given for septic tank absorption fields, sewage lagoons, and trench and area sanitary landfills. Soil suitability ratings of *good, fair,* and *poor* are given for daily cover for landfill.

A rating of *slight* or *good* indicates that the soils have no limitations or that the limitations can be easily overcome. Good performance and low maintenance can be expected. A rating of *moderate* or *fair* indicates that the limitations should be recognized but generally can be overcome by good management or special design. A rating of *severe* or *poor* indicates that overcoming the limitations is difficult or impractical. Increased maintenance may be required.

Septic tank absorption fields are areas in which subsurface systems of tile or perforated pipe distribute effluent from a septic tank into the natural soil. The centerline of the tile is assumed to be at a depth of 24 inches. Only the part of the soil between depths of 24 and 60 inches is considered in making the ratings. The soil properties and site features considered are those that affect the absorption of the effluent, those that affect the construction and maintenance of the system, and those that may affect public health.

The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted, relatively impervious soil material. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Relatively impervious soil material for the lagoon floor and sides is desirable to

minimize seepage and contamination of local ground water.

The table "Sanitary Facilities" gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Trench sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil that is excavated from the trench. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. Soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations in rating the soils.

Area sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil that is imported from a source away from the site. A final cover of soil at least 2 feet thick is placed over the completed landfill. Soil properties that influence trafficability, revegetation, and the risk of pollution are the main considerations in rating the soils for area sanitary landfills.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. The ratings in the table "Sanitary Facilities" are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The suitability of a soil for use as cover is based on properties that affect workability and the ease of digging, moving, and spreading the material over the refuse daily during both wet and dry periods.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Waste Management

Soil properties are important when organic waste is applied as fertilizer and wastewater is applied in irrigated areas. They also are important when the soil is used as a medium for the treatment and disposal of the organic waste and wastewater. Unfavorable soil properties can result in environmental damage.

The use of organic waste and wastewater as production resources results in energy and resource conservation and minimizes the problems associated with waste disposal. If disposal is the goal, applying a maximum amount of the organic waste or the wastewater to a minimal area holds costs to a minimum and environmental damage is the main hazard. If reuse is the goal, a minimum amount should be applied to a maximum area and environmental damage is unlikely.

Interpretations developed for waste management may include ratings for manure- and food-processing waste, municipal sewage sludge, use of wastewater for irrigation, and treatment of wastewater by slow rate, overland flow, and rapid infiltration processes.

Specific information regarding waste management is available at the local office of the Natural Resources Conservation Service or the Cooperative Extension

Construction Materials

The table "Construction Materials" gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In the table "Construction Materials," the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have one or more of the following characteristics: a plasticity index of more than 10, a high shrink-swell potential, many stones, slopes of more than 25 percent, or a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table "Construction Materials," only the probability of finding material in suitable quantity in or below the soil is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

The table "Water Management" gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In the table "Water Management," the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and

BUILDING SITE DEVELOPMENT

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1:						
Alberton----------	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Slight
2:						
Ambrant----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
3:						
Ambrant----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rochester--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
Rock outcrop.						
4:						
Aquic Haploxerolls.						
5:						
Aquic Udorthents.						
6:						
Aquolls.						
Aquepts.						
7:						
Argixerolls.						
Haploxerolls.						
8:						
Argixerolls.						
Haploxerolls.						
9:						
Argixerolls.						
Haploxerolls.						
10:						
Argixerolls.						
Haploxerolls.						
11:						
Auggie-----------	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength, frost action	Moderate: slope

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
12:						
Bata	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: small stones, large stones, droughty
13:						
Bata	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Waldbillig	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
14:						
Beeskove	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
15:						
Beeskove	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
16:						
Bigarm	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: small stones, large stones, droughty
17:						
Bigarm	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope, frost action	Moderate: small stones, large stones, droughty
18:						
Bigarm	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
19:						
Bigarm	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
20:						
Bigarm	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
21:						
Biglake	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: droughty
22:						
Biglake	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
23:						
Bignell	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
24:						
Bignell	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Winkler	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, droughty, slope
25:						
Bignell	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Winkler	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
26:						
Borohemists.						
27:						
Chickaman	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, frost action	Severe: slope
28:						
Chickaman	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, frost action	Severe: slope
29:						
Coerock	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: small stones, slope, depth to rock
Rock outcrop.						
30:						
Coerock	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: small stones, slope, depth to rock
Rock outcrop.						
31:						
Courville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
32:						
Courville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Mitten	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
33:						
Crow	Moderate: too clayey, slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: large stones, slope
34:						
Desmet	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
35:						
Elkner	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Ovando	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
36:						
Evaro	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
37:						
Evaro	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
38:						
Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
39:						
Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
40:						
Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
41:						
Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
42:						
Glaciercreek	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: small stones, large stones, droughty
43:						
Glaciercreek variant	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope, frost action	Moderate: slope
Glaciercreek	Severe: cutbanks cave	Moderate: slope, large stones	Moderate: slope, large stones	Severe: slope	Moderate: slope, large stones	Moderate: small stones, large stones, droughty
44:						
Grantsdale	Severe:	Slight	Slight	Slight	Moderate:	Slight

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
45: Grassvalley-----	Moderate: too clayey	Slight	Slight	Slight	Severe: low strength	Slight
46: Grassvalley-----	Moderate: too clayey	Slight	Slight	Moderate: slope	Severe: low strength	Slight
47: Grassvalley-----	Moderate: too clayey, slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: slope
48: Grassvalley-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength, slope	Severe: slope
49: Greenough-------	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength, frost action	Moderate: large stones, slope
50: Hagstadt--------	Moderate: depth to rock, slope	Moderate: slope	Moderate: depth to rock, slope	Severe: slope	Severe: low strength, frost action	Moderate: slope, depth to rock
51: Half Moon-------	Slight	Slight	Slight	Moderate: slope	Moderate: low strength, frost action	Moderate: large stones
52: Hanaker---------	Slight	Slight	Slight	Slight	Severe: low strength	Slight
53: Hollandlake-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
54: Hollandlake-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Bata------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
55: Hollandlake-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Bata------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
56: Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
57:						
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
58:						
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
59:						
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
60:						
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
61:						
Jimlake---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
62:						
Jimlake---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
63:						
Lantern---------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
64:						
Lantern---------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
65:						
Lantern---------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
66:						
Lolopeak--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
67:						
Lolopeak--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
Rock outcrop.						

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
68:						
Lubrecht	Moderate: depth to rock, too clayey, slope	Moderate: slope	Moderate: depth to rock, slope	Severe: slope	Severe: low strength	Moderate: slope, depth to rock
69:						
Mitten	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
70:						
Mitten	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Sharrott	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: slope, depth to rock
71:						
Mitten	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Tevis	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
72:						
Moiese	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: small stones, large stones, droughty
73:						
Orthents.						
74:						
Ovando	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
Elkner	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
75:						
Perma	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: frost action, large stones	Moderate: small stones, large stones, droughty
76:						
Perma	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
77:						
Perma	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: slope, large stones	Moderate: frost action, large stones	Moderate: small stones, large stones, droughty

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
78:						
Perma variant---	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: large stones
79:						
Perma variant---	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Perma-----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
80:						
Petty-----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
81:						
Petty-----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
82:						
Petty-----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
83:						
Petty-----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
84:						
Petty-----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
85:						
Petty-----------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
86:						
Phillcher-------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
87:						
Phillcher-------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
88:						
Pits.						

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
89:						
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
90:						
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
91:						
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
92:						
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
Rock outcrop.						
93:						
Riverwash.						
94:						
Rock outcrop.						
Rubble land.						
95:						
Rumblecreek	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
96:						
Selway	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
97:						
Selway	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
98:						
Selway	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
99:						
Sharrott	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: slope, depth to rock	Severe: depth to rock, slope	Severe: slope, depth to rock
Rock outcrop.						
100:						
Shooflin	Moderate: too clayey, slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: large stones, slope

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
101:						
Tally variant---	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
102:						
Tevis-----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
103:						
Tevis-----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
Mitten----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
104:						
Tevis-----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: droughty, slope
Mitten----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
105:						
Totelake--------	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: slope, large stones	Moderate: frost action, large stones	Moderate: small stones, large stones, droughty
106:						
Totelake--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
107:						
Totelake--------	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: slope, large stones	Moderate: frost action, large stones	Severe: droughty
108:						
Trapps----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
109:						
Trapps----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
110:						
Turrah----------	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: low strength, frost action	Moderate: wetness
111:						
Udifluvents.						
112:						
Udorthents.						

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
112:						
Glaciercreek----	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: slope, large stones	Moderate: large stones	Moderate: small stones, large stones, droughty
113:						
Upsata----------	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: slope, large stones	Moderate: large stones	Severe: droughty
114:						
Urban land.						
115:						
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
116:						
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
117:						
Waldbillig------	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope, frost action	Moderate: small stones, large stones, droughty
Auggie----------	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength, frost action	Moderate: slope
118:						
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
119:						
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
120:						
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
121:						
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Holloway--------	Severe: cutbanks cave, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
122:						
Whitore---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
123:						
Whitore---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
124:						
Wildgen---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
125:						
Wildgen---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Winkler---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
126:						
Wildgen---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Winkler---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
127:						
Wildgen---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Winkler---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, droughty, slope
128:						
Wildgen---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Winkler---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, droughty, slope
129:						
Winfall---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
130:						
Winkler---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
131:						
Winkler---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
132:						
Winkler---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
133:						
Winkler----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
134:						
Winkler----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: small stones, slope
Rubble land.						
135:						
Winkler----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
136:						
Xerofluvents.						
137:						
Yourame----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

SANITARY FACILITIES

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1:					
Alberton	Severe: poor filter	Severe: seepage	Moderate: too sandy	Slight	Fair: too sandy
2:					
Ambrant	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, too sandy, small stones
3:					
Ambrant	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, too sandy, small stones
Rochester	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, too sandy, small stones
Rock outcrop.					
4:					
Aquic Haploxerolls.					
5:					
Aquic Udorthents.					
6:					
Aquolls.					
Aquepts.					
7:					
Argixerolls.					
Haploxerolls.					
8:					
Argixerolls.					
Haploxerolls.					
9:					
Argixerolls.					
Haploxerolls.					
10:					
Argixerolls.					
Haploxerolls.					

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
11:					
Auggie	Severe: percs slowly	Severe: slope	Moderate: slope, too clayey	Moderate: slope	Fair: too clayey, slope
12:					
Bata	Severe: percs slowly	Moderate: seepage, slope	Moderate: too clayey	Slight	Poor: small stones
13:					
Bata	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Waldbillig	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
14:					
Beeskove	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
15:					
Beeskove	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
Rock outcrop.					
16:					
Bigarm	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
17:					
Bigarm	Moderate: slope	Severe: seepage, slope	Severe: seepage	Severe: seepage	Poor: small stones
18:					
Bigarm	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: small stones, slope
19:					
Bigarm	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: small stones, slope
20:					
Bigarm	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: small stones, slope
Rock outcrop.					

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21:					
Biglake---------	Severe: poor filter	Severe: seepage, slope	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy, small stones
22:					
Biglake---------	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, too sandy, small stones
23:					
Bignell---------	Severe: percs slowly, slope	Severe: slope	Severe: slope, too clayey	Severe: slope	Poor: too clayey, small stones, slope
24:					
Bignell---------	Severe: percs slowly, slope	Severe: slope	Severe: slope, too clayey	Severe: slope	Poor: too clayey, small stones, slope
Winkler---------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
25:					
Bignell---------	Severe: percs slowly, slope	Severe: slope	Severe: slope, too clayey	Severe: slope	Poor: too clayey, small stones, slope
Winkler---------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
26:					
Borohemists.					
27:					
Chickaman-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
28:					
Chickaman-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
29:					
Coerock---------	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Poor: depth to rock, small stones, slope
Rock outcrop.					

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
30:					
Coerock	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Poor: depth to rock, small stones, slope
Rock outcrop.					
31:					
Courville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
32:					
Courville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Mitten	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
33:					
Crow	Severe: percs slowly	Severe: slope	Severe: too clayey	Moderate: slope	Poor: too clayey, hard to pack
34:					
Desmet	Moderate: percs slowly	Moderate: seepage	Slight	Slight	Good
35:					
Elkner	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: small stones, slope
Ovando	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
36:					
Evaro	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
37:					
Evaro	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
38:					
Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
39: Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
40: Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
41: Felan	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
42: Glaciercreek	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy, large stones	Severe: seepage	Poor: seepage, too sandy, small stones
43: Glaciercreek variant	Moderate: slope	Severe: seepage, slope	Severe: seepage	Severe: seepage	Poor: large stones
Glaciercreek	Severe: poor filter	Severe: seepage, slope	Severe: seepage, too sandy, large stones	Severe: seepage	Poor: seepage, too sandy, small stones
44: Grantsdale	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy, small stones
45: Grassvalley	Severe: percs slowly	Moderate: slope	Severe: too clayey	Slight	Poor: too clayey
46: Grassvalley	Severe: percs slowly	Moderate: slope	Severe: too clayey	Slight	Poor: too clayey
47: Grassvalley	Severe: percs slowly	Severe: slope	Severe: too clayey	Moderate: slope	Poor: too clayey
48: Grassvalley	Severe: percs slowly, slope	Severe: slope	Severe: slope, too clayey	Severe: slope	Poor: too clayey, slope
49: Greenough	Severe: percs slowly	Severe: slope	Moderate: slope, too clayey	Moderate: slope	Fair: too clayey, slope

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
50:					
Hagstadt	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
51:					
Half Moon	Severe: percs slowly	Moderate: slope	Moderate: too clayey	Slight	Fair: too clayey
52:					
Hanaker	Severe: percs slowly	Moderate: seepage, slope	Slight	Slight	Poor: small stones
53:					
Hollandlake	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
54:					
Hollandlake	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Bata	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
55:					
Hollandlake	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Bata	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
56:					
Holloway	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
57:					
Holloway	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
58:					
Holloway	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
59:					
Holloway	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
60:					
Holloway	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Rock outcrop.					
61:					
Jimlake	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
62:					
Jimlake	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
63:					
Lantern	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
64:					
Lantern	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
65:					
Lantern	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Rock outcrop.					
66:					
Lolopeak	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope, large stones	Severe: seepage, slope	Poor: seepage, small stones, slope
67:					
Lolopeak	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope, large stones	Severe: seepage, slope	Poor: seepage, small stones, slope
Rock outcrop.					
68:					
Lubrecht	Severe: depth to rock, percs slowly	Severe: depth to rock, slope	Severe: depth to rock, too clayey	Severe: depth to rock	Poor: depth to rock, too clayey
69:					
Mitten	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones,

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
70:					
Mitten----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Sharrott--------	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Poor: depth to rock, small stones, slope
71:					
Mitten----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Tevis-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
72:					
Moiese----------	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy, small stones
73:					
Orthents.					
74:					
Ovando----------	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Elkner----------	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: small stones, slope
Rock outcrop.					
75:					
Perma-----------	Moderate: percs slowly, large stones	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
76:					
Perma-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope, large stones	Severe: seepage, slope	Poor: small stones, slope
77:					
Perma-----------	Moderate: percs slowly, large stones	Severe: seepage, slope, large stones	Severe: seepage, large stones	Severe: seepage	Poor: small stones

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
78:					
Perma variant---	Severe: percs slowly	Moderate: slope	Moderate: too clayey, large stones	Slight	Poor: small stones
79:					
Perma variant---	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Perma-----------	Severe: slope	Severe: seepage, slope, large stones	Severe: seepage, slope, large stones	Severe: seepage, slope	Poor: small stones, slope
80:					
Petty-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
81:					
Petty-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
82:					
Petty-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
83:					
Petty-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
84:					
Petty-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
85:					
Petty-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Rock outcrop.					
86:					
Phillcher-------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
87:					
Phillcher	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Rock outcrop.					
88:					
Pits.					
89:					
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
90:					
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
91:					
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
92:					
Repp	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
Rock outcrop.					
93:					
Riverwash.					
94:					
Rock outcrop.					
Rubble land.					
95:					
Rumblecreek	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
96:					
Selway	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
97:					
Selway	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
98:					
Selway----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
99:					
Sharrott--------	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Poor: depth to rock, small stones, slope
Rock outcrop.					
100:					
Shooflin--------	Severe: percs slowly	Severe: slope	Severe: depth to rock, too clayey	Moderate: depth to rock, slope	Poor: too clayey, hard to pack
101:					
Tally variant---	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy
102:					
Tevis-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
103:					
Tevis-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Mitten----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
104:					
Tevis-----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Mitten----------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Rock outcrop.					
105:					
Totelake--------	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy, small stones

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
106:					
Totelake--------	Severe: poor filter, slope	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, too sandy, small stones
107:					
Totelake--------	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy, large stones	Severe: seepage	Poor: seepage, too sandy, small stones
108:					
Trapps----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
109:					
Trapps----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage, small stones, slope
110:					
Turrah----------	Severe: wetness, percs slowly	Slight	Severe: wetness, too clayey	Severe: wetness	Poor: too clayey, hard to pack, wetness
111: Udifluvents.					
112: Udorthents.					
Glaciercreek----	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy, large stones	Severe: seepage	Poor: seepage, too sandy, small stones
113:					
Upsata----------	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy, small stones
114: Urban land.					
115:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
116:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
117:					
Waldbillig------	Moderate: percs slowly, slope	Severe: slope	Moderate: slope, large stones	Moderate: slope	Poor: small stones
Auggie----------	Severe: percs slowly	Severe: slope	Moderate: slope, too clayey	Moderate: slope	Fair: too clayey, slope
118:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Holloway--------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
119:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Holloway--------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
120:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Holloway--------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
121:					
Waldbillig------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Holloway--------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
122:					
Whitore---------	Severe: slope	Severe: slope, large stones	Severe: slope, large stones	Severe: slope	Poor: small stones, slope
123:					
Whitore---------	Severe: slope	Severe: slope, large stones	Severe: slope, large stones	Severe: slope	Poor: small stones, slope
124:					
Wildgen---------	Severe:	Severe:	Severe:	Severe:	Poor:

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
125:					
Wildgen	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Winkler	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
126:					
Wildgen	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Winkler	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
127:					
Wildgen	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Winkler	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
128:					
Wildgen	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
Winkler	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
129:					
Winfall	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope
130:					
Winkler	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
131:					
Winkler	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
132:					
Winkler	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope

SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
133:					
Winkler---------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
134:					
Winkler---------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Rubble land.					
135:					
Winkler---------	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, small stones, slope
Rock outcrop.					
136:					
Xerofluvents.					
137:					
Yourame---------	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones, slope

CONSTRUCTION MATERIALS

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1: Alberton	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
2: Ambrant	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
3: Ambrant	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Rochester	Poor: slope	Probable	Probable	Poor: too sandy, small stones, area reclaim
Rock outcrop.				
4: Aquic Haploxerolls.				
5: Aquic Udorthents.				
6: Aquolls.				
Aquepts.				
7: Argixerolls.				
Haploxerolls.				
8: Argixerolls.				
Haploxerolls.				
9: Argixerolls.				
Haploxerolls.				
10: Argixerolls.				
Haploxerolls.				
11: Auggie	Good	Improbable: excess fines	Improbable: excess fines	Fair: too clayey, small stones, slope

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
12:				
Bata	Good	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim
13:				
Bata	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Waldbillig	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
14:				
Beeskove	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
15:				
Beeskove	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				
16:				
Bigarm	Good	Improbable: small stones	Probable	Poor: small stones, area reclaim
17:				
Bigarm	Good	Improbable: small stones	Probable	Poor: small stones, area reclaim
18:				
Bigarm	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
19:				
Bigarm	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
20:				
Bigarm	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
21:				
Biglake	Good	Improbable: small stones	Probable	Poor: too sandy, small stones, area reclaim
22:				
Biglake	Fair: slope	Improbable: small stones	Probable	Poor: too sandy, small stones, area reclaim
23:				
Bignell	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, small stones, area reclaim
24:				
Bignell	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, small stones, area reclaim
Winkler	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
25:				
Bignell	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, small stones, area reclaim
Winkler	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
26:				
Borohemists.				
27:				
Chickaman	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
28:				
Chickaman	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
29:				
Coerock	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock, small stones, slope
Rock outcrop.				

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
30:				
Coerock	Poor: depth to rock, slope	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock, small stones, slope
Rock outcrop.				
31:				
Courville	Fair: large stones, slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
32:				
Courville	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Mitten	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
33:				
Crow	Good	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
34:				
Desmet	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
35:				
Elkner	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Ovando	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
36:				
Evaro	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
37:				
Evaro	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
38:				
Felan	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
39:				
Felan	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
40:				
Felan	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
41:				
Felan	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
42:				
Glaciercreek	Fair: large stones	Probable	Probable	Poor: too sandy, small stones, area reclaim
43:				
Glaciercreek variant	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
Glaciercreek	Fair: large stones	Probable	Probable	Poor: too sandy, small stones, area reclaim
44:				
Grantsdale	Good	Probable	Probable	Poor: area reclaim
45:				
Grassvalley	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
46:				
Grassvalley	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
47:				
Grassvalley	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
48:				
Grassvalley	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, slope
49:				
Greenough	Fair: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey, small stones, area reclaim

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
50:				
Hagstadt	Poor: depth to rock, low strength	Improbable: excess fines	Improbable: excess fines	Fair: depth to rock, too clayey, small stones
51:				
Half Moon	Fair: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey, large stones
52:				
Hanaker	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
53:				
Hollandlake	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
54:				
Hollandlake	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Bata	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
55:				
Hollandlake	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Bata	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
56:				
Holloway	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
57:				
Holloway	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
58:				
Holloway	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
59:				
Holloway	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
60:				
Holloway	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				
61:				
Jimlake	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
62:				
Jimlake	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
63:				
Lantern	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
64:				
Lantern	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
65:				
Lantern	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				
66:				
Lolopeak	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
67:				
Lolopeak	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
68:				
Lubrecht	Poor: depth to rock, low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
69:				
Mitten	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
70:				
Mitten	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Sharrott	Poor: depth to rock, slope	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock, small stones, slope
71:				
Mitten	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Tevis	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
72:				
Moiese	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim
73:				
Orthents.				
74:				
Ovando	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Elkner	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Rock outcrop.				
75:				
Perma	Fair: large stones	Improbable: small stones	Probable	Poor: small stones, area reclaim

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
76:				
Perma-----------	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
77:				
Perma-----------	Fair: large stones	Improbable: small stones	Probable	Poor: small stones, area reclaim
78:				
Perma variant---	Good	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim
79:				
Perma variant---	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Perma-----------	Fair: large stones, slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
80:				
Petty-----------	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
81:				
Petty-----------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
82:				
Petty-----------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
83:				
Petty-----------	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
84:				
Petty-----------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
85:				
Petty-----------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
85:				
Rock outcrop.				
86:				
Phillcher-------	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
87:				
Phillcher-------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				
88:				
Pits.				
89:				
Repp------------	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
90:				
Repp------------	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
91:				
Repp------------	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
92:				
Repp------------	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				
93:				
Riverwash.				
94:				
Rock outcrop.				
Rubble land.				
95:				
Rumblecreek-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
96:				
Selway----------	Fair: slope	Probable	Probable	Poor: small stones,

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
97:				
Selway	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
98:				
Selway	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
99:				
Sharrott	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock, small stones, slope
Rock outcrop.				
100:				
Shooflin	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
101:				
Tally variant	Good	Probable	Probable	Fair: small stones, area reclaim, thin layer
102:				
Tevis	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
103:				
Tevis	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
Mitten	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
104:				
Tevis	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
Mitten	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				
105:				
Totelake	Fair: large stones	Probable	Probable	Poor: too sandy, small stones, area reclaim

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
106:				
Totelake	Fair: large stones, slope	Probable	Probable	Poor: too sandy, small stones, area reclaim
107:				
Totelake	Fair: large stones	Probable	Probable	Poor: too sandy, small stones, area reclaim
108:				
Trapps	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
109:				
Trapps	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
110:				
Turrah	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, area reclaim
111: Udifluvents.				
112: Udorthents.				
Glaciercreek	Fair: large stones	Probable	Probable	Poor: too sandy, small stones, area reclaim
113:				
Upsata	Fair: large stones	Probable	Probable	Poor: too sandy, small stones, area reclaim
114: Urban land.				
115:				
Waldbillig	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
116:				
Waldbillig	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
117:				
Waldbillig	Good	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim
Auggie	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey, small stones, slope
118:				
Waldbillig	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Holloway	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
119:				
Waldbillig	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Holloway	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
120:				
Waldbillig	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Holloway	Fair: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
121:				
Waldbillig	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Holloway	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
122:				
Whitore	Fair: large stones, slope	Improbable: excess fines, large stones	Improbable: excess fines, large stones	Poor: small stones, area reclaim, slope

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
123:				
Whitore	Poor: slope	Improbable: excess fines, large stones	Improbable: excess fines, large stones	Poor: small stones, area reclaim, slope
124:				
Wildgen	Fair: large stones, slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
125:				
Wildgen	Fair: large stones, slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Winkler	Fair: large stones, slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
126:				
Wildgen	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Winkler	Poor: slope	Improbable: small stones	Probable	Poor: small stones, area reclaim, slope
127:				
Wildgen	Fair: large stones, slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Winkler	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
128:				
Wildgen	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope
Winkler	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
129:				
Winfall	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope

CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
130:				
Winkler---------	Fair: slope	Probable	Probable	Poor: small stones, area reclaim, slope
131:				
Winkler---------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
132:				
Winkler---------	Fair: large stones, slope	Probable	Probable	Poor: small stones, area reclaim, slope
133:				
Winkler---------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
134:				
Winkler---------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Rubble land.				
135:				
Winkler---------	Poor: slope	Probable	Probable	Poor: small stones, area reclaim, slope
Rock outcrop.				
136:				
Xerofluvents.				
137:				
Yourame---------	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones, area reclaim, slope

WATER MANAGEMENT

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
1:							
Alberton	Severe: seepage	Severe: seepage, piping	Severe: no water	Deep to water	Soil blowing	Too sandy, soil blowing	Too arid
2:							
Ambrant	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
3:							
Ambrant	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
Rochester	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
Rock outcrop.							
4:							
Aquic Haploxerolls.							
5:							
Aquic Udorthents.							
6:							
Aquolls.							
Aquepts.							
7:							
Argixerolls.							
Haploxerolls.							
8:							
Argixerolls.							
Haploxerolls.							
9:							
Argixerolls.							
Haploxerolls.							
10:							
Argixerolls.							
Haploxerolls.							
11:							
Auggie	Severe: slope	Moderate: thin layer, piping	Severe: no water	Deep to water	Slope, erodes easily	Slope, erodes easily	Slope, erodes easily

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
12: Bata----------	Moderate: seepage, slope	Slight	Severe: no water	Deep to water	Slope, droughty	Favorable	Droughty
13: Bata----------	Severe: slope	Slight	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
14: Beeskove------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
15: Beeskove------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
Rock outcrop.							
16: Bigarm--------	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Droughty	Large stones	Large stones, droughty
17: Bigarm--------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
18: Bigarm--------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
19: Bigarm--------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
20: Bigarm--------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
Rock outcrop.							
21: Biglake-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, too sandy	Large stones, slope, droughty
22: Biglake-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, too sandy	Large stones, slope, droughty

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
23:							
Bignell	Severe: slope	Moderate: large stones	Severe: no water	Deep to water	Slope, droughty, percs slowly	Slope, large stones, percs slowly	Large stones, slope, droughty
24:							
Bignell	Severe: slope	Moderate: large stones	Severe: no water	Deep to water	Slope, droughty, percs slowly	Slope, large stones, percs slowly	Large stones, slope, droughty
Winkler	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones, soil blowing	Large stones, slope, droughty
25:							
Bignell	Severe: slope	Moderate: large stones	Severe: no water	Deep to water	Slope, droughty, percs slowly	Slope, large stones, percs slowly	Large stones, slope, droughty
Winkler	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Large stones, slope, droughty
26:							
Borohemists.							
27:							
Chickaman	Severe: slope	Severe: piping	Severe: no water	Deep to water	Slope	Slope	Slope
28:							
Chickaman	Severe: slope	Severe: piping	Severe: no water	Deep to water	Slope	Slope	Slope
29:							
Coerock	Severe: depth to rock, slope	Severe: thin layer	Severe: no water	Deep to water	Slope, droughty, depth to rock	Slope, large stones, depth to rock	Large stones, slope, droughty
Rock outcrop.							
30:							
Coerock	Severe: depth to rock, slope	Severe: thin layer	Severe: no water	Deep to water	Slope, droughty, depth to rock	Slope, large stones, depth to rock	Large stones, slope, droughty
Rock outcrop.							
31:							
Courville	Severe: slope	Moderate: large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
32:							
Courville	Severe: slope	Moderate: large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
32: Mitten	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
33: Crow	Severe: slope	Moderate: hard to pack	Severe: no water	Deep to water	Slope, percs slowly, erodes easily	Slope, erodes easily, percs slowly	Slope, erodes easily, percs slowly
34: Desmet	Moderate: seepage	Severe: piping	Severe: no water	Deep to water	Favorable	Erodes easily	Erodes easily
35: Elkner	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
Ovando	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
36: Evaro	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
37: Evaro	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
38: Felan	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope	Slope	Slope
39: Felan	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope	Slope	Slope
40: Felan	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope	Slope	Slope
41: Felan	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope	Slope	Slope
42: Glaciercreek	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Large stones, droughty	Large stones, too sandy	Large stones, droughty
43: Glaciercreek variant	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, soil blowing	Slope, soil blowing	Slope
Glaciercreek	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones, too sandy	Large stones, slope, droughty

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
44: Grantsdale	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Rooting depth	Erodes easily, too sandy	Erodes easily, rooting depth
45: Grassvalley	Slight	Slight	Severe: no water	Deep to water	Percs slowly, erodes easily	Erodes easily, percs slowly	Erodes easily, percs slowly
46: Grassvalley	Moderate: slope	Slight	Severe: no water	Deep to water	Slope, percs slowly, erodes easily	Erodes easily, percs slowly	Erodes easily, percs slowly
47: Grassvalley	Severe: slope	Slight	Severe: no water	Deep to water	Slope, percs slowly, erodes easily	Slope, erodes easily, percs slowly	Slope, erodes easily, percs slowly
48: Grassvalley	Severe: slope	Slight	Severe: no water	Deep to water	Slope, percs slowly, erodes easily	Slope, erodes easily, percs slowly	Slope, erodes easily, percs slowly
49: Greenough	Severe: slope	Moderate: piping	Severe: no water	Deep to water	Slope, erodes easily	Slope, erodes easily	Slope, erodes easily
50: Hagstadt	Severe: slope	Severe: thin layer	Severe: no water	Deep to water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
51: Half Moon	Moderate: slope	Severe: piping	Severe: no water	Deep to water	Slope, erodes easily	Erodes easily	Erodes easily
52: Hanaker	Moderate: seepage, slope	Slight	Severe: no water	Deep to water	Slope, erodes easily	Erodes easily	Erodes easily
53: Hollandlake	Severe: slope	Slight	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
54: Hollandlake	Severe: slope	Slight	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
Bata	Severe: slope	Slight	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
55: Hollandlake	Severe: slope	Slight	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
Bata	Severe: slope	Slight	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
56: Holloway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
57: Holloway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
58: Holloway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
59: Holloway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
60: Holloway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
Rock outcrop.							
61: Jimlake	Severe: slope	Moderate: seepage, piping	Severe: no water	Deep to water	Slope	Slope	Slope
62: Jimlake	Severe: slope	Moderate: seepage, piping	Severe: no water	Deep to water	Slope	Slope	Slope
63: Lantern	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
64: Lantern	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
65: Lantern	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
Rock outcrop.							
66: Lolopeak	Severe: seepage, slope	Severe: seepage, large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
67: Lolopeak	Severe: seepage, slope	Severe: seepage, large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
Rock outcrop.							

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
68: Lubrecht	Severe: slope	Severe: thin layer	Severe: no water	Deep to water	Slope, percs slowly, depth to rock	Slope, depth to rock, erodes easily	Slope, erodes easily, depth to rock
69: Mitten	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
70: Mitten	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
Sharrott	Severe: depth to rock, slope	Severe: thin layer	Severe: no water	Deep to water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
71: Mitten	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
Tevis	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
72: Moiese	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Droughty	Large stones, too sandy	Large stones, droughty
73: Orthents.							
74: Ovando	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
Elkner	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, too sandy, soil blowing	Slope, droughty
Rock outcrop.							
75: Perma	Severe: seepage	Moderate: thin layer, seepage, piping	Severe: no water	Deep to water	Large stones, droughty	Large stones	Large stones, droughty
76: Perma	Severe: seepage, slope	Moderate: thin layer, seepage, piping	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
77: Perma----------	Severe: seepage	Severe: large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Large stones	Large stones, droughty
78: Perma variant-	Moderate: slope	Moderate: large stones	Severe: no water	Deep to water	Slope	Large stones	Large stones
79: Perma variant-	Severe: slope	Moderate: large stones	Severe: no water	Deep to water	Slope	Slope, large stones	Large stones, slope
Perma----------	Severe: seepage, slope	Severe: large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
80: Petty----------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
81: Petty----------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
82: Petty----------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
83: Petty----------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
84: Petty----------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
85: Petty----------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
Rock outcrop.							
86: Phillcher------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
87: Phillcher------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
Rock outcrop.							

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
88: Pits.							
89: Repp	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
90: Repp	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
91: Repp	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
92: Repp	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
Rock outcrop.							
93: Riverwash.							
94: Rock outcrop.							
Rubble land.							
95: Rumblecreek	Severe: slope	Slight	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
96: Selway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, soil blowing	Slope, droughty
97: Selway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, soil blowing	Slope, droughty
98: Selway	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, too sandy	Slope, droughty, rooting depth
99: Sharrott	Severe: depth to rock, slope	Severe: thin layer	Severe: no water	Deep to water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
Rock outcrop.							
100: Shooflin	Severe: slope	Severe: hard to pack	Severe: no water	Deep to water	Slope, percs slowly, erodes easily	Slope, erodes easily, percs slowly	Slope, erodes easily, percs slowly

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
101:							
Tally variant	Severe: seepage	Severe: seepage, piping	Severe: no water	Deep to water	Droughty, soil blowing	Too sandy, soil blowing	Droughty
102:							
Tevis	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
103:							
Tevis	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
Mitten	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
104:							
Tevis	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
Mitten	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
Rock outcrop.							
105:							
Totelake	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Large stones, too sandy	Large stones, droughty
106:							
Totelake	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones, too sandy	Large stones, slope, droughty
107:							
Totelake	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Large stones, too sandy	Large stones, droughty
108:							
Trapps	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
109:							
Trapps	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope	Slope, droughty
110:							
Turrah	Slight	Severe: hard to pack, wetness	Severe: slow refill	Percs slowly, frost action	Wetness, percs slowly, rooting depth	Wetness, percs slowly	Wetness, rooting depth, percs slowly
111:							
Udifluvents.							

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
112: Udorthents.							
Glaciercreek--	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Large stones, too sandy	Large stones, droughty
113: Upsata--------	Severe: seepage	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Large stones, too sandy, soil blowing	Large stones, droughty, rooting depth
114: Urban land.							
115: Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
116: Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
117: Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
Auggie--------	Severe: slope	Moderate: piping	Severe: no water	Deep to water	Slope	Slope	Slope
118: Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
Holloway------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
119: Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
Holloway------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
120: Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
Holloway------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
121:							
Waldbillig----	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
Holloway------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, rooting depth	Slope, large stones	Large stones, slope, droughty
122:							
Whitore-------	Severe: slope	Severe: large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
123:							
Whitore-------	Severe: slope	Severe: large stones	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
124:							
Wildgen-------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
125:							
Wildgen-------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
126:							
Wildgen-------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
127:							
Wildgen-------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Large stones, slope, droughty
128:							
Wildgen-------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Large stones, slope, droughty

WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
129:							
Winfall-------	Severe: slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty
130:							
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Large stones, slope, droughty
131:							
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Large stones, slope, droughty
132:							
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
133:							
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
134:							
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Large stones, slope, droughty
Rubble land.							
135:							
Winkler-------	Severe: seepage, slope	Severe: seepage	Severe: no water	Deep to water	Slope, large stones, droughty	Slope, large stones	Large stones, slope, droughty
Rock outcrop.							
136:							
Xerofluvents.							
137:							
Yourame-------	Severe: slope	Moderate: large stones	Severe: no water	Deep to water	Slope, droughty	Slope, large stones	Large stones, slope, droughty

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

The table "Engineering Index Properties" gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials *(3)* and the Unified soil classification system *(4)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

The tables "Physical Properties of the Soils" and "Chemical Properties of the Soils" show estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

The following paragraphs describe the columns in the table "Physical Properties of the Soils."

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In the table "Physical Properties of the Soils," the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Organic matter is the plant and animal residue in the

soil at various stages of decomposition. In the table "Physical Properties of Soils," the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (up to 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils generally are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams that have more than 5 percent finely divided calcium carbonate. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils have less than 5 percent finely divided calcium carbonate. They are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

The following paragraphs describe the columns in the table "Chemical Properties of the Soils."

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the soil. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Water Features

The table "Water Features" gives estimates of several important water features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Hydrologic soil groups are groups of soils that, when saturated, have the same runoff potential under similar storm and ground cover conditions. The soil properties that affect the runoff potential are those that influence the minimum rate of infiltration in a bare soil after prolonged wetting and when the soil is not frozen. These properties include the depth to a seasonal high water table, the intake rate, permeability after prolonged wetting, and the depth to a very slowly permeable layer. The influences of ground cover and slope are treated independently and are not taken into account in hydrologic soil groups.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil layers.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils of moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in marshes and swamps or in closed depressions is considered to be ponding.

The table "Water Features" gives the frequency of flooding. Frequency of occurrence is estimated. Frequency generally is expressed as none, rare, occasional, or frequent. *None* means flooding is not probable; *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year).

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is a zone of saturation at the highest average depth during the wettest season. It is at least 6 inches thick, persists in the soil for more than a few weeks, and is within 6 feet of the surface. Indicated in the table "Water Features" are the depth to the seasonal high water table, the kind of water table, and the months of the year when the water table usually is highest.

An *apparent* water table is indicated by the level at which water stands in a freshly dug, unlined borehole after adequate time is allowed for adjustments in the surrounding soil.

A *perched* water table is one that is above an

unsaturated zone in the soil. The basis for determining that a water table is perched may be general knowledge of the area. The water table is proven to be perched if the water level in a borehole is observed to fall when the borehole is extended.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation.

Soil Features

The table "Soil Features" gives estimates of several important soil features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than; and NP means nonplastic)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
1:												
Alberton--------	0-9	Very fine sandy loam	ML, CL-ML	A-4	0	0	100	100	85-95	50-65	20-30	NP-10
	9-16	Sandy loam, fine sandy loam	SM, SM-SC	A-4	0	0	100	100	65-80	35-50	20-30	NP-10
	16-30	Sandy loam, fine sandy loam	SM	A-2, A-4	0	0	100	100	60-75	30-45	---	NP
	30-60	Loamy sand, loamy fine sand	SM	A-1, A-2	0	0	85-100	75-100	40-80	15-35	---	NP
2:												
Ambrant---------	0-4	Gravelly sandy loam	GM, SM	A-1, A-2	0	0-5	55-85	50-75	30-55	15-30	20-25	NP-5
	4-20	Gravelly coarse sandy loam, gravelly loamy coarse sand	SM, GM	A-1, A-2	0	0-5	55-85	50-75	25-60	10-25	20-25	NP-5
	20-39	Gravelly sandy loam, gravelly coarse sandy loam	GM, SM	A-1, A-2	0	0-5	55-85	50-75	30-55	15-30	20-25	NP-5
	39-60	Very gravelly coarse sand, very gravelly loamy sand, very gravelly sand	GP, SP, SP-SM, GP-GM	A-1	0	0	50-65	25-50	10-35	0-10	---	NP
3:												
Ambrant---------	0-4	Gravelly sandy loam	GM, SM	A-1, A-2	0	0-5	55-85	50-75	30-55	15-30	20-25	NP-5
	4-20	Gravelly coarse sandy loam, gravelly loamy coarse sand	SM, GM	A-1, A-2	0	0-5	55-85	50-75	25-60	10-25	20-25	NP-5
	20-39	Gravelly sandy loam, gravelly coarse sandy loam	GM, SM	A-1, A-2	0	0-5	55-85	50-75	30-55	15-30	20-25	NP-5
	39-60	Very gravelly coarse sand, very gravelly loamy sand, very gravelly sand	GP, SP, SP-SM, GP-GM	A-1	0	0	50-65	25-50	10-35	0-10	---	NP
Rochester-------	0-7	Gravelly sandy loam	SM	A-1, A-2	0	0	60-85	50-75	30-55	15-30	---	NP
	7-12	Gravelly loamy coarse sand, gravelly coarse sand	SP-SM, SM	A-1	0	0	60-85	50-75	25-40	5-20	---	NP
	12-60	Very gravelly loamy coarse sand, very gravelly coarse sand	GP, SP	A-1	0	0	35-60	25-50	15-30	0-5	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
3: Rock outcrop.												
4: Aquic Haploxerolls.												
5: Aquic Udorthents.												
6: Aquolls.												
Aquepts.												
7: Argixerolls.												
Haploxerolls.												
8: Argixerolls.												
Haploxerolls.												
9: Argixerolls.												
Haploxerolls.												
10: Argixerolls.												
Haploxerolls.												
11: Auggie----------	0-6	Silt loam	CL-ML, ML	A-4	0	0	95-100	85-100	85-95	85-95	20-30	NP-10
	6-20	Silty clay loam	CL	A-6	0	0	90-100	85-100	85-95	85-95	30-40	10-15
	20-45	Silty clay loam	CL	A-6	0	0	90-100	85-100	85-95	85-90	30-40	10-15
	45-60	Silt loam	ML, CL-ML	A-4	0	0	90-100	85-100	75-95	65-90	20-30	NP-10
12: Bata------------	0-10	Gravelly silt loam	GM, GM-GC, CL-ML, ML	A-4	0	0-10	60-85	55-75	50-70	40-60	20-30	NP-10
	10-22	Very gravelly fine sandy loam, very gravelly sandy loam, gravelly loam	GC, GM-GC, SC, SM-SC	A-2	0	0-15	40-70	30-60	20-50	10-35	25-35	5-15
	22-60	Very gravelly sandy clay loam, very gravelly clay loam	GC	A-2, A-6	0	0-15	35-60	30-50	20-45	15-40	30-40	10-20

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
13:												
Bata------------	0-9	Gravelly silt loam	GM, GM-GC, CL-ML, ML	A-4	0	0-10	60-85	55-75	50-70	40-60	20-30	NP-10
	9-20	Very gravelly fine sandy loam, very gravelly sandy loam, gravelly loam	GC, GM-GC, SC, SM-SC	A-2	0	0-15	40-70	30-60	20-50	10-35	25-35	5-15
	20-60	Very gravelly sandy clay loam, very gravelly clay loam	GC	A-2, A-6	0	0-15	35-60	30-50	20-45	15-40	30-40	10-20
Waldbillig------	0-10	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	10-26	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	26-60	Very gravelly fine sandy loam, very gravelly sandy loam, very gravelly loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10
14:												
Beeskove--------	0-8	Gravelly loam	ML, GM	A-4	0	0	60-80	55-75	45-70	35-60	20-25	NP-5
	8-20	Very gravelly loam, very gravelly sandy loam	GM	A-2, A-1	0	0-15	40-55	35-50	30-45	20-35	20-25	NP-5
	20-27	Very gravelly loam, very gravelly sandy loam, extremely gravelly loam	GM	A-1, A-2	0	0-15	35-60	25-50	20-45	15-30	20-25	NP-5
	27-60	Extremely gravelly loam, extremely gravelly sandy loam	GP-GM, GM	A-1	0	10-15	25-40	15-30	10-25	5-20	20-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
15:												
Beeskove--------	0-8	Gravelly loam	ML, GM	A-4	0	0	60-80	55-75	45-70	35-60	20-25	NP-5
	8-20	Very gravelly loam, very gravelly sandy loam	GM	A-2, A-1	0	0-15	40-55	35-50	30-45	20-35	20-25	NP-5
	20-27	Very gravelly loam, very gravelly sandy loam, extremely gravelly loam	GM	A-1, A-2	0	0-15	35-60	25-50	20-45	15-30	20-25	NP-5
	27-60	Extremely gravelly loam, extremely gravelly sandy loam	GP-GM, GM	A-1	0	10-15	25-40	15-30	10-25	5-20	20-25	NP-5
Rock outcrop.												
16:												
Bigarm----------	0-11	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-10	65-80	55-70	45-60	40-55	20-30	5-10
	11-15	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC	A-2, A-1	0	0-20	40-50	30-50	20-40	15-35	15-25	NP-10
	15-40	Very gravelly fine sandy loam, very gravelly loam, very gravelly sandy loam	GM	A-1, A-2	0	0-20	40-60	30-50	20-40	15-35	15-25	NP-5
	40-60	Extremely gravelly loamy sand, very gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1, A-2	0	10-40	25-55	15-45	10-40	5-30	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
17:												
Bigarm----------	0-11	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-10	65-80	55-70	45-60	40-55	20-30	5-10
	11-15	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC	A-2, A-1	0	0-20	40-50	30-50	20-40	15-35	15-25	NP-10
	15-40	Very gravelly fine sandy loam, very gravelly loam, very gravelly sandy loam	GM	A-1, A-2	0	0-20	40-60	30-50	20-40	15-35	15-25	NP-5
	40-60	Extremely gravelly loamy sand, very gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1, A-2	0	10-40	25-55	15-45	10-40	5-30	15-25	NP-5
18:												
Bigarm----------	0-11	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-10	65-80	55-70	45-60	40-55	20-30	5-10
	11-15	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC	A-2, A-1	0	0-20	40-50	30-50	20-40	15-35	15-25	NP-10
	15-40	Very gravelly fine sandy loam, very gravelly loam, very gravelly sandy loam	GM	A-1, A-2	0	0-20	40-60	30-50	20-40	15-35	15-25	NP-5
	40-60	Extremely gravelly loamy sand, very gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1, A-2	0	10-40	25-55	15-45	10-40	5-30	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
19:												
Bigarm----------	0-11	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-10	65-80	55-70	45-60	40-55	20-30	5-10
	11-15	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC	A-2, A-1	0	0-20	40-50	30-50	20-40	15-35	15-25	NP-10
	15-40	Very gravelly fine sandy loam, very gravelly loam, very gravelly sandy loam	GM	A-1, A-2	0	0-20	40-60	30-50	20-40	15-35	15-25	NP-5
	40-60	Extremely gravelly loamy sand, very gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1, A-2	0	10-40	25-55	15-45	10-40	5-30	15-25	NP-5
20:												
Bigarm----------	0-11	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-10	65-80	55-70	45-60	40-55	20-30	5-10
	11-15	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC	A-2, A-1	0	0-20	40-50	30-50	20-40	15-35	15-25	NP-10
	15-40	Very gravelly fine sandy loam, very gravelly loam, very gravelly sandy loam	GM	A-1, A-2	0	0-20	40-60	30-50	20-40	15-35	15-25	NP-5
	40-60	Extremely gravelly loamy sand, very gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1, A-2	0	10-40	25-55	15-45	10-40	5-30	15-25	NP-5
Rock outcrop.												
21:												
Biglake---------	0-9	Gravelly sandy loam	SM	A-2, A-1	0	0-15	65-85	60-75	35-55	20-30	15-20	NP-5
	9-16	Very gravelly sandy loam	GM, SM	A-1	0	0-25	40-60	35-50	20-35	10-20	---	NP
	16-60	Extremely gravelly loamy sand, extremely gravelly sand	GP, GP-GM	A-1	0	15-25	20-35	15-30	10-20	0-10	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
22:												
Biglake---------	0-9	Gravelly sandy loam	SM	A-2, A-1	0	0-15	65-85	60-75	35-55	20-30	15-20	NP-5
	9-16	Very gravelly sandy loam	GM, SM	A-1	0	0-25	40-60	35-50	20-35	10-20	---	NP
	16-60	Extremely gravelly loamy sand, extremely gravelly sand	GP, GP-GM	A-1	0	15-25	20-35	15-30	10-20	0-10	---	NP
23:												
Bignell---------	0-11	Gravelly loam	SM, GM, SM-SC, GM-GC	A-2, A-4	0	0-10	60-80	55-75	50-70	25-45	15-25	NP-10
	11-15	Very gravelly loam, very gravelly sandy clay loam	GM-GC, GM	A-2, A-1	0	0-10	35-55	30-50	25-45	10-30	15-30	NP-10
	15-60	Very gravelly clay, very gravelly sandy clay, very gravelly clay loam	GC	A-2, A-7, A-6	0	0-25	40-55	35-50	25-45	20-40	30-60	15-40
24:												
Bignell---------	0-12	Gravelly loam	SM, GM, SM-SC, GM-GC	A-2, A-4	0	0-10	60-80	55-75	50-70	25-45	15-25	NP-10
	12-22	Very gravelly loam, very gravelly sandy clay loam	GM-GC, GM	A-2, A-1	0	0-10	35-55	30-50	25-45	10-30	15-30	NP-10
	22-60	Very gravelly clay, very gravelly sandy clay, very gravelly clay loam	GC	A-2, A-7, A-6	0	0-25	40-55	35-50	25-45	20-40	30-60	15-40
Winkler---------	0-4	Very gravelly sandy loam	GM, SM	A-1	0	0-10	40-60	30-50	20-35	10-20	15-25	NP-5
	4-21	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	21-40	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	40-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
25:												
Bignell	0-11	Gravelly loam	SM, GM, SM-SC, GM-GC	A-2, A-4	0	0-10	60-80	55-75	50-70	25-45	15-25	NP-10
	11-15	Very gravelly loam, very gravelly sandy clay loam	GM-GC, GM	A-2, A-1	0	0-10	35-55	30-50	25-45	10-30	15-30	NP-10
	15-60	Very gravelly clay, very gravelly sandy clay, very gravelly clay loam	GC	A-2, A-7, A-6	0	0-25	40-55	35-50	25-45	20-40	30-60	15-40
Winkler	0-8	Very gravelly sandy loam	GM, SM	A-1	0	0-10	40-60	30-50	20-35	10-20	15-25	NP-5
	8-25	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	25-42	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	42-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5
26:												
Borohemists.												
27:												
Chickaman	0-9	Silt loam	ML, MH	A-5	0	0	90-100	85-100	80-100	70-95	45-55	NP-10
	9-30	Silt loam	ML	A-4, A-5	0	0	90-100	85-100	80-100	70-95	35-45	NP-10
	30-60	Silt loam	ML	A-4	0	0-5	90-100	85-100	80-100	65-90	---	NP
28:												
Chickaman	0-9	Silt loam	ML, MH	A-5	0	0	90-100	85-100	80-100	70-95	45-55	NP-10
	9-30	Silt loam	ML	A-4, A-5	0	0	90-100	85-100	80-100	70-95	35-45	NP-10
	30-60	Silt loam	ML	A-4	0	0-5	90-100	85-100	80-100	65-90	---	NP
29:												
Coerock	0-15	Very gravelly silt loam	GM	A-2, A-4, A-1	0	0-15	40-60	30-50	25-50	20-45	30-40	NP-10
	15-18	Very gravelly loam, very gravelly silt loam	GM	A-2, A-4	0	10-25	40-65	35-55	30-50	25-45	30-40	NP-10
	18-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
29: Rock outcrop.												
30: Coerock---------	0-15	Very gravelly silt loam	GM	A-2, A-4, A-1	0	0-15	40-60	30-50	25-50	20-45	30-40	NP-10
	15-18	Very gravelly loam, very gravelly silt loam	GM	A-2, A-4	0	10-25	40-65	35-55	30-50	25-45	30-40	NP-10
	18-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
31: Courville-------	0-10	Gravelly silt loam	ML, SM, GM	A-4	0	0-15	65-85	60-80	50-70	40-60	30-40	NP-5
	10-27	Very gravelly loam, very gravelly silt loam, very gravelly sandy loam	GM, SM	A-4, A-2, A-1	0	15-30	40-70	35-65	30-60	20-50	20-30	NP-5
	27-60	Very gravelly loam, very gravelly silt loam, very gravelly sandy loam	GM-GC	A-2, A-4	0	15-30	40-70	35-65	30-60	20-50	25-30	5-10
32: Courville-------	0-10	Gravelly silt loam	ML, SM, GM	A-4	0	0-15	65-85	60-80	50-70	40-60	30-40	NP-5
	10-27	Very gravelly loam, very gravelly silt loam, very gravelly sandy loam	GM, SM	A-4, A-2, A-1	0	15-30	40-70	35-65	30-60	20-50	20-30	NP-5
	27-60	Very gravelly loam, very gravelly silt loam, very gravelly sandy loam	GM-GC	A-2, A-4	0	15-30	40-70	35-65	30-60	20-50	25-30	5-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
32: Mitten----------	0-9	Gravelly silt loam	GM, ML	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	9-16	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	10-15	35-65	30-55	20-45	10-30	---	NP
	16-34	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-30	25-40	15-30	10-25	5-15	---	NP
	34-60	Extremely gravelly sandy loam, extremely gravelly coarse sandy loam, extremely gravelly loam	GP-GM	A-1	0	15-30	20-40	10-30	5-20	5-10	---	NP
33: Crow------------	0-4	Silt loam	CL-ML, ML	A-4	0	0-10	90-100	85-100	75-100	60-90	20-30	NP-10
	4-10	Silty clay loam, clay loam, silt loam	CL	A-6	0	0-10	90-100	85-100	75-100	55-90	25-40	10-20
	10-48	Silty clay, clay	CH, CL	A-7	0	0-10	90-100	85-100	75-95	70-90	40-60	20-40
	48-60	Sandy clay loam, clay loam	SC, CL	A-6	0	0-10	90-100	85-90	55-85	45-70	25-35	10-15
34: Desmet----------	0-7	Loam	CL-ML, ML	A-4	0	0	100	100	95-100	75-85	20-30	NP-10
	7-15	Loam, very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	95-100	70-80	20-30	NP-10
	15-24	Loam, silt loam, very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	95-100	70-95	20-30	NP-10
	24-39	Very fine sandy loam	ML	A-4	0	0	85-100	75-100	65-100	55-75	20-25	NP-5
	39-60	Very fine sandy loam, fine sandy loam	ML, SM	A-4, A-2	0	0	85-100	75-100	60-100	30-65	20-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
35:												
Elkner	0-7	Sandy loam	SM	A-2, A-4	0	0	80-100	75-100	45-70	25-40	20-30	NP-5
	7-20	Gravelly sandy loam, sandy loam, coarse sandy loam	SM	A-1, A-2	0	0-10	75-100	70-100	35-60	20-35	---	NP
	20-36	Coarse sandy loam, gravelly coarse sandy loam	SM	A-1, A-2	0	0-10	75-100	70-100	30-60	20-35	---	NP
	36-60	Gravelly loamy coarse sand	SM	A-1	0	0-15	70-90	60-75	25-50	10-25	---	NP
Ovando	0-6	Gravelly sandy loam	SM, GM	A-2, A-1	0	0	60-85	50-75	30-55	15-30	---	NP
	6-25	Very gravelly loamy coarse sand	GP-GM, GM, SM, SP-SM	A-1	0	0	45-60	35-50	15-25	5-15	---	NP
	25-49	Very gravelly loamy coarse sand	GP-GM, GM, SM, SP-SM	A-1	0	0-15	40-60	30-50	15-25	5-15	---	NP
	49-60	Extremely gravelly loamy coarse sand	GP-GM, GP	A-1	0	15-30	25-40	15-30	5-15	0-10	---	NP
36:												
Evaro	0-4	Gravelly loam	ML, SM	A-4	0	0-15	75-80	60-75	50-70	40-60	25-35	NP-10
	4-16	Very gravelly loam, very gravelly sandy loam, extremely gravelly sandy loam	GM, GM-GC, GP-GM	A-2, A-1	0	10-25	20-60	15-50	10-45	5-30	20-30	NP-10
	16-60	Extremely gravelly sandy loam, extremely gravelly loam	GM, GM-GC, GP-GM	A-1, A-2	0	10-25	20-35	15-30	10-25	5-20	20-30	NP-10
37:												
Evaro	0-4	Gravelly loam	ML, SM	A-4	0	0-15	75-80	60-75	50-70	40-60	25-35	NP-10
	4-16	Very gravelly loam, very gravelly sandy loam, extremely gravelly sandy loam	GM, GM-GC, GP-GM	A-2, A-1	0	10-25	20-60	15-50	10-45	5-30	20-30	NP-10
	16-60	Extremely gravelly sandy loam, extremely gravelly loam	GM, GM-GC, GP-GM	A-1, A-2	0	10-25	20-35	15-30	10-25	5-20	20-30	NP-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
38:												
Felan-----------	0-8	Gravelly silt loam	ML, GM	A-4	0	0-10	65-80	60-75	50-75	40-65	30-40	NP-5
	8-33	Very gravelly silt loam, very gravelly loam, extremely gravelly silt loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	30-60	20-50	20-45	15-40	20-30	NP-10
	33-60	Very gravelly silt loam, very gravelly loam, extremely gravelly loam	GM-GC, GM	A-2, A-1	0	0-15	25-55	15-45	15-40	10-35	20-30	NP-10
39:												
Felan-----------	0-8	Gravelly silt loam	ML, GM	A-4	0	0-10	65-80	60-75	50-75	40-65	30-40	NP-5
	8-33	Very gravelly silt loam, very gravelly loam, extremely gravelly silt loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	30-60	20-50	20-45	15-40	20-30	NP-10
	33-60	Very gravelly silt loam, very gravelly loam, extremely gravelly loam	GM-GC, GM	A-2, A-1	0	0-15	25-55	15-45	15-40	10-35	20-30	NP-10
40:												
Felan-----------	0-12	Gravelly silt loam	ML, GM	A-4	0	0-10	65-80	60-75	50-75	40-65	30-40	NP-5
	12-40	Very gravelly silt loam, very gravelly loam, extremely gravelly silt loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	30-60	20-50	20-45	15-40	20-30	NP-10
	40-60	Very gravelly silt loam, very gravelly loam, extremely gravelly loam	GM-GC, GM	A-2, A-1	0	0-15	25-55	15-45	15-40	10-35	20-30	NP-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
41:												
Felan-----------	0-12	Gravelly silt loam	ML, GM	A-4	0	0-10	65-80	60-75	50-75	40-65	30-40	NP-5
	12-40	Very gravelly silt loam, very gravelly loam, extremely gravelly silt loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	30-60	20-50	20-45	15-40	20-30	NP-10
	40-60	Very gravelly silt loam, very gravelly loam, extremely gravelly loam	GM-GC, GM	A-2, A-1	0	0-15	25-55	15-45	15-40	10-35	20-30	NP-10
42:												
Glaciercreek----	0-14	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	55-70	40-60	20-25	NP-5
	14-60	Extremely gravelly coarse sand, extremely gravelly loamy sand, extremely cobbly sand	GP, GP-GM	A-1	0	10-45	20-50	10-30	5-20	0-10	---	NP
43:												
Glaciercreek variant--------	0-9	Fine sandy loam	SM, ML	A-4	0	0	95-100	90-100	65-85	35-55	20-30	NP-5
	9-32	Fine sandy loam	SM	A-4	0	0	95-100	90-100	65-85	35-50	20-30	NP-5
	32-60	Extremely cobbly fine sandy loam, very cobbly fine sandy loam	SM, GM	A-1, A-2	0	30-75	45-70	35-60	25-50	15-35	---	NP
Glaciercreek----	0-14	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	55-70	40-60	20-25	NP-5
	14-60	Extremely gravelly coarse sand, extremely gravelly loamy sand, extremely cobbly sand	GP, GP-GM	A-1	0	10-45	20-50	10-30	5-20	0-10	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
44:												
Grantsdale------	0-9	Loam	CL-ML	A-4	0	0	100	100	90-100	75-85	20-25	5-10
	9-17	Loam, very fine sandy loam, silt loam	CL-ML	A-4	0	0	100	100	90-100	75-85	20-25	5-10
	17-32	Loam, very fine sandy loam, silt loam	CL-ML	A-4	0	0	100	100	90-100	70-85	20-25	5-10
	32-60	Very gravelly loamy sand, very gravelly sand, extremely cobbly loamy sand	GP, SP, GP-GM, SP-SM	A-1	0	10-30	35-65	25-55	15-40	0-10	---	NP
45:												
Grassvalley-----	0-9	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-95	30-40	10-20
	9-21	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	21-28	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	28-60	Silty clay, silty clay loam, clay	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25
46:												
Grassvalley-----	0-9	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-95	30-40	10-20
	9-23	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	23-39	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	39-60	Silty clay, silty clay loam, clay	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25
47:												
Grassvalley-----	0-7	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-95	30-40	10-20
	7-24	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	24-52	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	52-60	Silty clay, silty clay loam, clay	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25
48:												
Grassvalley-----	0-7	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-95	30-40	10-20
	7-24	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	24-52	Clay, silty clay	CL	A-7	0	0	100	100	95-100	75-95	40-50	15-25
	52-60	Silty clay, silty clay loam, clay	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
49: Greenough--------	0-8	Silt loam	ML, CL-ML	A-4	0	0-10	90-100	85-100	80-100	70-90	20-30	NP-10
	8-22	Silt loam	ML, CL-ML	A-4	0	0-10	90-100	85-100	80-100	70-90	20-30	NP-10
	22-49	Silty clay loam, silt loam	CL	A-6	0	0-10	90-100	85-100	80-100	75-90	30-40	10-20
	49-60	Silt loam, gravelly silt loam, silty clay loam	CL, GC	A-6	0	0-10	60-100	55-100	50-95	40-90	30-40	10-20
50: Hagstadt---------	0-5	Silt loam	CL-ML	A-4	0	0	90-100	85-100	85-100	75-95	20-30	5-10
	5-21	Silty clay loam	CL	A-6	0	0	90-100	90-100	90-100	75-95	30-40	10-20
	21-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
51: Half Moon--------	0-7	Silt loam	ML	A-4	0	0-15	95-100	95-100	90-100	75-90	25-40	NP-10
	7-18	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	90-100	90-100	75-95	25-40	5-15
	18-60	Silt loam, silty clay loam	CL-ML	A-4	0	0	100	100	90-100	75-95	25-30	5-10
52: Hanaker----------	0-15	Silt loam	CL-ML	A-4	0	0	100	100	95-100	75-95	20-25	5-10
	15-25	Silty clay loam	CL	A-6	0	0	100	100	95-100	75-95	30-35	10-15
	25-32	Silt loam	CL-ML	A-4	0	0	100	100	95-100	75-95	20-25	5-10
	32-42	Stratified silt loam to very fine sandy loam	CL-ML	A-4	0	0	100	100	95-100	70-85	20-25	5-10
	42-60	Stratified gravelly sandy clay loam to gravelly sandy loam	GM-GC, SM-SC	A-2	0	0-10	55-80	55-75	40-55	20-35	25-30	5-10
53: Hollandlake------	0-4	Gravelly loam	CL-ML, ML, SM-SC, GM	A-4	0	0	55-80	50-75	45-70	35-60	20-30	NP-10
	4-12	Gravelly loam, gravelly silt loam	CL-ML, SM-SC, GM-GC	A-4	0	0	55-80	50-75	45-70	35-60	20-30	5-10
	12-22	Very gravelly loam, very gravelly clay loam	GC, GM-GC	A-2, A-4, A-6	0	0-15	40-55	35-50	30-45	25-40	25-35	5-15
	22-60	Very gravelly clay loam, very gravelly sandy clay loam	GC	A-2	0	0-15	40-55	35-50	30-45	20-35	30-40	10-15

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
54:												
Hollandlake-----	0-4	Gravelly loam	CL-ML, ML, SM-SC, GM	A-4	0	0	55-80	50-75	45-70	35-60	20-30	NP-10
	4-12	Gravelly loam, gravelly silt loam	CL-ML, SM-SC, GM-GC	A-4	0	0	55-80	50-75	45-70	35-60	20-30	5-10
	12-22	Very gravelly loam, very gravelly clay loam	GC, GM-GC	A-2, A-4, A-6	0	0-15	40-55	35-50	30-45	25-40	25-35	5-15
	22-60	Very gravelly clay loam, very gravelly sandy clay loam	GC	A-2	0	0-15	40-55	35-50	30-45	20-35	30-40	10-15
Bata------------	0-9	Gravelly silt loam	GM, GM-GC, CL-ML, ML	A-4	0	0-10	60-85	55-75	50-70	40-60	20-30	NP-10
	9-20	Very gravelly fine sandy loam, very gravelly sandy loam, gravelly loam	GC, GM-GC, SC, SM-SC	A-2	0	0-15	40-70	30-60	20-50	10-35	25-35	5-15
	20-60	Very gravelly sandy clay loam, very gravelly clay loam	GC	A-2, A-6	0	0-15	35-60	30-50	20-45	15-40	30-40	10-20
55:												
Hollandlake-----	0-4	Gravelly loam	CL-ML, ML, SM-SC, GM	A-4	0	0	55-80	50-75	45-70	35-60	20-30	NP-10
	4-12	Gravelly loam, gravelly silt loam	CL-ML, SM-SC, GM-GC	A-4	0	0	55-80	50-75	45-70	35-60	20-30	5-10
	12-22	Very gravelly loam, very gravelly clay loam	GC, GM-GC	A-2, A-4, A-6	0	0-15	40-55	35-50	30-45	25-40	25-35	5-15
	22-60	Very gravelly clay loam, very gravelly sandy clay loam	GC	A-2	0	0-15	40-55	35-50	30-45	20-35	30-40	10-15

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
55:												
Bata------------	0-9	Gravelly silt loam	GM, GM-GC, CL-ML, ML	A-4	0	0-10	60-85	55-75	50-70	40-60	20-30	NP-10
	9-20	Very gravelly fine sandy loam, very gravelly sandy loam, gravelly loam	GC, GM-GC, SC, SM-SC	A-2	0	0-15	40-70	30-60	20-50	10-35	25-35	5-15
	20-60	Very gravelly sandy clay loam, very gravelly clay loam	GC	A-2, A-6	0	0-15	35-60	30-50	20-45	15-40	30-40	10-20
56:												
Holloway--------	0-10	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	10-17	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	17-52	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	52-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
57:												
Holloway	0-10	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	10-17	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	17-52	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	52-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5
58:												
Holloway	0-11	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	11-21	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	21-45	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	45-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
59:												
Holloway--------	0-11	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	11-21	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	21-45	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	45-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5
60:												
Holloway--------	0-10	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	10-17	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	17-52	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	52-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5
Rock outcrop.												

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
61:												
Jimlake---------	0-7	Gravelly silt loam	ML, GM	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	7-14	Gravelly silt loam, gravelly loam	ML, GM	A-4	0	0-10	60-80	55-75	45-70	35-60	25-35	NP-10
	14-38	Very gravelly silt loam, very gravelly loam	GM, GM-GC	A-2, A-4, A-1	0	0-15	35-55	30-50	25-45	20-40	20-30	NP-10
	38-60	Very gravelly silt loam, very gravelly loam	GM, GM-GC	A-2, A-4, A-1	0	0-15	35-55	30-50	25-45	20-40	20-30	NP-10
62:												
Jimlake---------	0-7	Gravelly silt loam	ML, GM	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	7-14	Gravelly silt loam, gravelly loam	ML, GM	A-4	0	0-10	60-80	55-75	45-70	35-60	25-35	NP-10
	14-38	Very gravelly silt loam, very gravelly loam	GM, GM-GC	A-2, A-4, A-1	0	0-15	35-55	30-50	25-45	20-40	20-30	NP-10
	38-60	Very gravelly silt loam, very gravelly loam	GM, GM-GC	A-2, A-4, A-1	0	0-15	35-55	30-50	25-45	20-40	20-30	NP-10
63:												
Lantern---------	0-14	Gravelly sandy loam	SM	A-1, A-2	0	0	60-85	50-75	30-55	20-35	15-25	NP-5
	14-26	Gravelly sandy loam, very gravelly sandy loam	SM, GM	A-1, A-2	0	0-15	40-85	30-75	25-55	10-35	15-25	NP-5
	26-39	Very gravelly sandy loam, very gravelly fine sandy loam	GM	A-1	0	0-25	45-60	35-50	30-40	15-25	15-25	NP-5
	39-60	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loamy sand	GP-GM	A-1	0	0-30	30-50	15-30	10-25	5-10	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
64:												
Lantern	0-14	Gravelly sandy loam	SM	A-1, A-2	0	0	60-85	50-75	30-55	20-35	15-25	NP-5
	14-26	Gravelly sandy loam, very gravelly sandy loam	SM, GM	A-1, A-2	0	0-15	40-85	30-75	25-55	10-35	15-25	NP-5
	26-39	Very gravelly sandy loam, very gravelly fine sandy loam	GM	A-1	0	0-25	45-60	35-50	30-40	15-25	15-25	NP-5
	39-60	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loamy sand	GP-GM	A-1	0	0-30	30-50	15-30	10-25	5-10	15-25	NP-5
65:												
Lantern	0-14	Gravelly sandy loam	SM	A-1, A-2	0	0	60-85	50-75	30-55	20-35	15-25	NP-5
	14-26	Gravelly sandy loam, very gravelly sandy loam	SM, GM	A-1, A-2	0	0-15	40-85	30-75	25-55	10-35	15-25	NP-5
	26-39	Very gravelly sandy loam, very gravelly fine sandy loam	GM	A-1	0	0-25	45-60	35-50	30-40	15-25	15-25	NP-5
	39-60	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loamy sand	GP-GM	A-1	0	0-30	30-50	15-30	10-25	5-10	15-25	NP-5
Rock outcrop.												
66:												
Lolopeak	0-9	Bouldery loam	ML, GM, SM	A-4	0	10-15	65-95	60-85	50-80	35-65	30-40	NP-5
	9-27	Extremely stony loamy coarse sand, extremely gravelly loamy coarse sand	GP-GM	A-1	0	25-50	25-50	15-35	10-20	5-10	---	NP
	27-60	Extremely stony loamy coarse sand, extremely gravelly loamy coarse sand	GP-GM	A-1	0	25-50	25-50	15-35	10-20	5-10	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
67:												
Lolopeak	0-9	Bouldery loam	ML, GM, SM	A-4	0	10-15	65-95	60-85	50-80	35-65	30-40	NP-5
	9-27	Extremely stony loamy coarse sand, extremely gravelly loamy coarse sand	GP-GM	A-1	0	25-50	25-50	15-35	10-20	5-10	---	NP
	27-60	Extremely stony loamy coarse sand, extremely gravelly loamy coarse sand	GP-GM	A-1	0	25-50	25-50	15-35	10-20	5-10	---	NP
Rock outcrop.												
68:												
Lubrecht	0-8	Silt loam	ML, CL-ML	A-4	0	0	80-100	75-100	70-100	60-90	20-30	NP-10
	8-11	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-100	25-40	10-20
	11-30	Silty clay	CL	A-6, A-7	0	0	100	100	95-100	85-100	30-50	15-30
	30-36	Gravelly silty clay loam	CL, GC	A-6	0	0-10	60-85	55-75	50-70	45-65	25-40	10-20
	36-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
69:												
Mitten	0-9	Gravelly silt loam	GM, ML	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	9-16	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	10-15	35-65	30-55	20-45	10-30	---	NP
	16-34	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-30	25-40	15-30	10-25	5-15	---	NP
	34-60	Extremely gravelly sandy loam, extremely gravelly coarse sandy loam, extremely gravelly loam	GP-GM	A-1	0	15-30	20-40	10-30	5-20	5-10	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
70:												
Mitten----------	0-9	Gravelly silt loam	GM, ML	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	9-16	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	10-15	35-65	30-55	20-45	10-30	---	NP
	16-34	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-30	25-40	15-30	10-25	5-15	---	NP
	34-60	Extremely gravelly sandy loam, extremely gravelly coarse sandy loam, extremely gravelly loam	GP-GM	A-1	0	15-30	20-40	10-30	5-20	5-10	---	NP
Sharrott--------	0-7	Gravelly loam	GM-GC, CL-ML, SM-SC	A-4	0	0-15	65-80	60-75	45-65	35-55	20-30	5-10
	7-14	Very gravelly loam	GM-GC	A-1, A-2	0	0-15	35-60	30-50	20-40	15-35	20-30	5-10
	14-16	Extremely gravelly loam	GM-GC, GP-GC	A-1, A-2	0	0-15	20-35	10-25	5-20	5-15	20-30	5-10
	16-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
71:												
Mitten----------	0-9	Gravelly silt loam	GM, ML	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	9-16	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	10-15	35-65	30-55	20-45	10-30	---	NP
	16-34	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-30	25-40	15-30	10-25	5-15	---	NP
	34-60	Extremely gravelly sandy loam, extremely gravelly coarse sandy loam, extremely gravelly loam	GP-GM	A-1	0	15-30	20-40	10-30	5-20	5-10	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
71: Tevis	0-3	Gravelly loam	GM, GM-GC, ML, CL-ML	A-4	0	0	55-80	50-75	45-70	35-60	15-25	NP-10
	3-14	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	0-15	40-60	30-50	20-40	10-30	---	NP
	14-22	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP
	22-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP
72: Moiese	0-9	Gravelly loam	GM, GM-GC, SM, SM-SC	A-4	0	0-10	65-80	60-75	50-60	35-45	20-30	NP-10
	9-21	Very gravelly sandy loam	GM, SM	A-1	0	0-25	40-60	35-50	20-35	10-20	20-25	NP-5
	21-60	Very gravelly loamy sand, extremely gravelly sand, very gravelly loamy coarse sand	GP, GP-GM	A-1	0	0-30	30-45	20-35	10-25	0-10	---	NP
73: Orthents.												
74: Ovando	0-6	Gravelly sandy loam	SM, GM	A-2, A-1	0	0	60-85	50-75	30-55	15-30	---	NP
	6-25	Very gravelly loamy coarse sand	GP-GM, GM, SM, SP-SM	A-1	0	0	45-60	35-50	15-25	5-15	---	NP
	25-49	Very gravelly loamy coarse sand	GP-GM, GM, SM, SP-SM,	A-1	0	0-15	40-60	30-50	15-25	5-15	---	NP
	49-60	Extremely gravelly loamy	GP-GM, GP	A-1	0	15-30	25-40	15-30	5-15	0-10	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
74:												
Elkner----------	0-7	Sandy loam	SM	A-2, A-4	0	0	80-100	75-100	45-70	25-40	20-30	NP-5
	7-20	Gravelly sandy loam, sandy loam, coarse sandy loam	SM	A-1, A-2	0	0-10	75-100	70-100	35-60	20-35	---	NP
	20-36	Coarse sandy loam, gravelly coarse sandy loam	SM	A-1, A-2	0	0-10	75-100	70-100	30-60	20-35	---	NP
	36-60	Gravelly loamy coarse sand	SM	A-1	0	0-15	70-90	60-75	25-50	10-25	---	NP
Rock outcrop.												
75:												
Perma-----------	0-12	Gravelly loam	SM, SM-SC, GM, GM-GC	A-4	0	0-15	65-85	60-75	50-65	35-50	20-30	NP-10
	12-36	Very gravelly sandy loam, very cobbly loam, very cobbly sandy loam	GM-GC, GM, SM-SC, SM	A-2, A-4, A-1	0	10-40	50-70	40-60	30-50	20-40	20-30	NP-10
	36-60	Extremely gravelly loamy sand, extremely cobbly sandy loam, extremely gravelly loam	GM, GP, GP-GM	A-1	0	15-40	20-40	10-30	5-25	0-15	15-25	NP-5
76:												
Perma-----------	0-10	Gravelly loam	SM, SM-SC, GM, GM-GC	A-4	0	0-15	65-85	60-75	50-65	35-50	20-30	NP-10
	10-38	Very gravelly sandy loam, very cobbly loam, very cobbly sandy loam	GM-GC, GM, SM-SC, SM	A-2, A-4, A-1	0	10-40	50-70	40-60	30-50	20-40	20-30	NP-10
	38-60	Extremely gravelly loamy sand, extremely cobbly sandy loam, extremely gravelly loam	GM, GP, GP-GM	A-1	0	15-40	20-40	10-30	5-25	0-15	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
77:												
Perma	0-7	Stony loam	SM, SM-SC, ML, CL-ML	A-4	0	15-30	75-95	70-90	65-85	45-75	15-25	NP-10
	7-38	Very gravelly sandy loam, very cobbly loam, very cobbly sandy loam	GM-GC, GM, SM-SC, SM	A-2, A-4, A-1	0	10-40	50-70	40-60	30-50	20-40	20-30	NP-10
	38-60	Extremely gravelly loamy sand, extremely cobbly sandy loam, extremely gravelly loam	GM, GP, GP-GM	A-1	0	15-40	20-40	10-30	5-25	0-15	15-25	NP-5
78:												
Perma variant	0-12	Stony silt loam	ML	A-4	0	5-10	90-100	85-100	75-100	60-90	25-35	NP-10
	12-33	Very gravelly clay loam	GC	A-6, A-2	0	5-25	40-60	35-55	30-50	25-45	30-40	10-15
	33-60	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly loam	GM-GC, GC	A-4, A-6, A-2	0	5-25	40-65	35-55	30-50	20-40	25-35	5-15
79:												
Perma variant	0-12	Stony silt loam	ML	A-4	0	5-10	90-100	85-100	75-100	60-90	25-35	NP-10
	12-33	Very gravelly clay loam	GC	A-6, A-2	0	5-25	40-60	35-55	30-50	25-45	30-40	10-15
	33-60	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly loam	GM-GC, GC	A-4, A-6, A-2	0	5-25	40-65	35-55	30-50	20-40	25-35	5-15
Perma	0-7	Stony loam	SM, SM-SC, ML, CL-ML	A-4	0	15-30	75-95	70-90	65-85	45-75	15-25	NP-10
	7-38	Very gravelly sandy loam, very cobbly loam, very cobbly sandy loam	GM-GC, GM, SM-SC, SM	A-2, A-4, A-1	0	10-40	50-70	40-60	30-50	20-40	20-30	NP-10
	38-60	Extremely gravelly loamy sand, extremely cobbly sandy loam, extremely	GM, GP, GP-GM	A-1	0	15-40	20-40	10-30	5-25	0-15	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
80:												
Petty-----------	0-12	Gravelly loam	ML, SM, GM	A-4	0	0-10	60-80	55-75	45-70	35-60	30-40	NP-10
	12-24	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-15	45-65	35-55	10-35	5-30	15-25	NP-5
	24-36	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-25	45-65	35-55	15-40	5-30	15-25	NP-5
	36-60	Extremely gravelly coarse sandy loam, very gravelly loamy coarse sand	GM, GP-GM	A-1	0	10-25	35-55	25-45	10-35	5-25	15-25	NP-5
81:												
Petty-----------	0-12	Gravelly loam	ML, SM, GM	A-4	0	0-10	60-80	55-75	45-70	35-60	30-40	NP-10
	12-24	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-15	45-65	35-55	10-35	5-30	15-25	NP-5
	24-36	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-25	45-65	35-55	15-40	5-30	15-25	NP-5
	36-60	Extremely gravelly coarse sandy loam, very gravelly loamy coarse sand	GM, GP-GM	A-1	0	10-25	35-55	25-45	10-35	5-25	15-25	NP-5
82:												
Petty-----------	0-8	Bouldery loam	SM, GM, ML	A-4	0	10-15	65-90	60-85	50-80	35-65	30-40	NP-10
	8-18	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-15	45-65	35-55	10-35	5-30	15-25	NP-5
	18-32	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-25	45-65	35-55	15-40	5-30	15-25	NP-5
	32-60	Extremely gravelly coarse sandy loam, very gravelly loamy coarse sand	GM, GP-GM	A-1	0	10-25	35-55	25-45	10-35	5-25	15-25	NP-5
83:												
Petty-----------	0-9	Gravelly loam	ML, SM, GM	A-4	0	0-10	60-80	55-75	45-70	35-60	30-40	NP-10
	9-31	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-15	45-65	35-55	10-35	5-30	15-25	NP-5
	31-60	Extremely gravelly coarse sandy loam, very gravelly loamy coarse sand	GM, GP-GM	A-1	0	10-25	35-55	25-45	10-35	5-25	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
84:												
Petty	0-9	Bouldery loam	SM, GM, ML	A-4	0	10-15	65-90	60-85	50-80	35-65	30-40	NP-10
	9-30	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-25	45-65	35-55	15-40	5-30	15-25	NP-5
	30-60	Extremely gravelly coarse sandy loam, very gravelly loamy coarse sand	GM, GP-GM	A-1	0	10-25	35-55	25-45	10-35	5-25	15-25	NP-5
85:												
Petty	0-9	Bouldery loam	SM, GM, ML	A-4	0	10-15	65-90	60-85	50-80	35-65	30-40	NP-10
	9-30	Very gravelly coarse sandy loam	GM, SM, GP-GM, SP-SM	A-1, A-2	0	10-25	45-65	35-55	15-40	5-30	15-25	NP-5
	30-60	Extremely gravelly coarse sandy loam, very gravelly loamy coarse sand	GM, GP-GM	A-1	0	10-25	35-55	25-45	10-35	5-25	15-25	NP-5
Rock outcrop.												
86:												
Phillcher	0-10	Silt loam	ML	A-4	0	0	80-100	75-100	70-100	55-90	30-40	NP-5
	10-24	Very gravelly sandy loam	GM, SM	A-1	0	0-15	40-60	30-50	20-35	10-20	---	NP
	24-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	25-40	15-30	10-20	5-10	---	NP
87:												
Phillcher	0-10	Silt loam	ML	A-4	0	0	80-100	75-100	70-100	55-90	30-40	NP-5
	10-24	Very gravelly sandy loam	GM, SM	A-1	0	0-15	40-60	30-50	20-35	10-20	---	NP
	24-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	25-40	15-30	10-20	5-10	---	NP
Rock outcrop.												
88:												
Pits.												

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
89:												
Repp	0-12	Very gravelly loam	GM-GC, GM	A-2	0	0-10	45-60	40-50	35-45	25-35	15-25	NP-10
	12-24	Very gravelly loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	35-60	30-50	25-45	20-40	15-25	NP-10
	24-60	Extremely gravelly loam	GM, GP-GM	A-1	0	0-15	15-40	5-25	5-20	5-15	---	NP
90:												
Repp	0-9	Very gravelly loam	GM-GC, GM	A-2	0	0-10	45-60	40-50	35-45	25-35	15-25	NP-10
	9-24	Very gravelly loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	35-60	30-50	25-45	20-40	15-25	NP-10
	24-60	Extremely gravelly loam	GM, GP-GM	A-1	0	0-15	15-40	5-25	5-20	5-15	---	NP
91:												
Repp	0-9	Very gravelly loam	GM-GC, GM	A-2	0	0-10	45-60	40-50	35-45	25-35	15-25	NP-10
	9-24	Very gravelly loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	35-60	30-50	25-45	20-40	15-25	NP-10
	24-60	Extremely gravelly loam	GM, GP-GM	A-1	0	0-15	15-40	5-25	5-20	5-15	---	NP
92:												
Repp	0-12	Very gravelly loam	GM-GC, GM	A-2	0	0-10	45-60	40-50	35-45	25-35	15-25	NP-10
	12-24	Very gravelly loam	GM-GC, GM	A-2, A-4, A-1	0	0-15	35-60	30-50	25-45	20-40	15-25	NP-10
	24-60	Extremely gravelly loam	GM, GP-GM	A-1	0	0-15	15-40	5-25	5-20	5-15	---	NP
Rock outcrop.												
93:												
Riverwash.												
94:												
Rock outcrop.												
Rubble land.												

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
95:												
Rumblecreek-----	0-8	Gravelly loam	SM, CL-ML, GM, SM-SC	A-2, A-4	0	0	60-85	50-75	45-70	30-60	20-30	NP-10
	8-20	Gravelly loam	GM-GC, GM, CL-ML, SM-SC	A-2, A-4	0	0	60-85	50-75	45-70	30-60	20-30	NP-10
	20-32	Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam	GC, GM-GC	A-2	0	0-15	35-60	30-50	25-45	20-35	25-40	5-15
	32-60	Very gravelly clay loam, very gravelly sandy clay loam	GC, GM-GC	A-2, A-4, A-6	0	0-15	35-60	30-50	25-45	20-40	25-40	5-15
96:												
Selway----------	0-18	Gravelly sandy loam	SM, GM	A-1, A-2	0	0	55-85	50-75	30-55	15-30	15-25	NP-5
	18-51	Very gravelly coarse sandy loam, extremely gravelly coarse sandy loam	GM, GP-GM, SM, SP-SM	A-1	0	0	25-60	15-50	5-30	5-20	15-25	NP-5
	51-60	Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand	GP-GM, GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-25	5-15	---	NP
97:												
Selway----------	0-18	Gravelly sandy loam	SM, GM	A-1, A-2	0	0	55-85	50-75	30-55	15-30	15-25	NP-5
	18-51	Very gravelly coarse sandy loam, extremely gravelly coarse sandy loam	GM, GP-GM, SM, SP-SM	A-1	0	0	25-60	15-50	5-30	5-20	15-25	NP-5
	51-60	Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand	GP-GM, GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-25	5-15	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
98:												
Selway----------	0-5	Bouldery sandy loam	SM	A-1, A-2	0	5-10	60-90	55-80	30-55	15-30	15-25	NP-5
	5-34	Very gravelly coarse sandy loam, extremely gravelly coarse sandy loam	GM, GP-GM, SM, SP-SM	A-1	0	0	25-60	15-50	5-30	5-20	15-25	NP-5
	34-60	Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand	GP-GM, GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-25	5-15	---	NP
99:												
Sharrott--------	0-4	Gravelly loam	GM-GC, CL-ML, SM-SC	A-4	0	0-15	65-80	60-75	45-65	35-55	20-30	5-10
	4-13	Very gravelly loam	GM-GC	A-1, A-2	0	0-15	35-60	30-50	20-40	15-35	20-30	5-10
	13-15	Extremely gravelly loam	GM-GC, GP-GC	A-1, A-2	0	0-15	20-35	10-25	5-20	5-15	20-30	5-10
	15-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
100:												
Shooflin--------	0-12	Silt loam	ML, CL-ML	A-4	0	0-15	95-100	90-100	75-100	60-90	20-30	NP-10
	12-51	Clay	CH	A-7	0	0-10	95-100	95-100	85-100	70-95	55-80	30-50
	51-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	
101:												
Tally variant---	0-10	Sandy loam	SM	A-2, A-4	0	0	100	100	60-70	30-40	20-25	NP-5
	10-20	Sandy loam	SM	A-2, A-4	0	0	100	100	60-70	30-40	20-25	NP-5
	20-30	Loamy sand, sand	SM	A-2	0	0	100	100	50-70	10-25	---	NP
	30-60	Sand, gravelly sand	SM, SP-SM	A-1, A-3, A-2	0	0	60-100	50-100	25-60	5-15	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
102:												
Tevis	0-3	Gravelly loam	GM, GM-GC, ML, CL-ML	A-4	0	0	55-80	50-75	45-70	35-60	15-25	NP-10
	3-14	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	0-15	40-60	30-50	20-40	10-30	---	NP
	14-22	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP
	22-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP
103:												
Tevis	0-3	Gravelly loam	GM, GM-GC, ML, CL-ML	A-4	0	0	55-80	50-75	45-70	35-60	15-25	NP-10
	3-14	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	0-15	40-60	30-50	20-40	10-30	---	NP
	14-22	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP
	22-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
103:												
Mitten----------	0-9	Gravelly silt loam	GM, ML	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	9-16	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	10-15	35-65	30-55	20-45	10-30	---	NP
	16-34	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-30	25-40	15-30	10-25	5-15	---	NP
	34-60	Extremely gravelly sandy loam, extremely gravelly coarse sandy loam, extremely gravelly loam	GP-GM	A-1	0	15-30	20-40	10-30	5-20	5-10	---	NP
104:												
Tevis-----------	0-3	Gravelly loam	GM, GM-GC, ML, CL-ML	A-4	0	0	55-80	50-75	45-70	35-60	15-25	NP-10
	3-14	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	0-15	40-60	30-50	20-40	10-30	---	NP
	14-22	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP
	22-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam, extremely gravelly loam	GM, GP-GM, GP	A-1	0	0-15	20-35	10-25	5-20	0-15	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
104:												
Mitten----------	0-9	Gravelly silt loam	GM, ML	A-4	0	0-10	60-80	55-75	50-70	40-65	30-40	NP-10
	9-16	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam	GM	A-1, A-2	0	10-15	35-65	30-55	20-45	10-30	---	NP
	16-34	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-30	25-40	15-30	10-25	5-15	---	NP
	34-60	Extremely gravelly sandy loam, extremely gravelly coarse sandy loam, extremely gravelly loam	GP-GM	A-1	0	15-30	20-40	10-30	5-20	5-10	---	NP
Rock outcrop.												
105:												
Totelake--------	0-7	Gravelly loam	ML, SM, GM	A-4	0	0-15	65-85	60-75	50-70	35-55	20-25	NP-5
	7-22	Very gravelly sandy loam	GM, SM	A-1	0	0-25	45-60	35-50	20-35	10-20	---	NP
	22-60	Extremely gravelly loamy sand, extremely gravelly sand	GP-GM, GP	A-1	0	25-40	25-40	15-30	10-25	0-10	---	NP
106:												
Totelake--------	0-7	Gravelly loam	ML, SM, GM	A-4	0	0-15	65-85	60-75	50-70	35-55	20-25	NP-5
	7-22	Very gravelly sandy loam	GM, SM	A-1	0	0-25	45-60	35-50	20-35	10-20	---	NP
	22-60	Extremely gravelly loamy sand, extremely gravelly sand	GP-GM, GP	A-1	0	25-40	25-40	15-30	10-25	0-10	---	NP

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
107:												
Totelake--------	0-4	Extremely stony loam	GM, SM, ML	A-4	0	10-25	70-100	65-90	55-85	40-70	30-40	NP-5
	4-17	Very gravelly sandy loam	GM, SM	A-1	0	0-25	45-60	35-50	20-35	10-20	---	NP
	17-60	Extremely gravelly loamy sand, extremely gravelly sand	GP-GM, GP	A-1	0	25-40	25-40	15-30	10-25	0-10	---	NP
108:												
Trapps----------	0-10	Gravelly loam	GM, ML, SM	A-2, A-4	0	0	55-80	50-75	45-70	30-60	15-25	NP-5
	10-24	Very gravelly clay loam	GC	A-2, A-6	0	0-15	30-55	25-50	20-50	15-45	30-35	10-15
	24-35	Very gravelly loam	GM	A-2, A-1	0	0-15	35-60	25-50	20-45	15-40	15-25	NP-5
	35-60	Extremely gravelly loam	GM, GP-GM	A-2, A-1, A-4	0	15-30	20-45	10-30	10-25	5-20	15-25	NP-5
109:												
Trapps----------	0-10	Gravelly loam	GM, ML, SM	A-2, A-4	0	0	55-80	50-75	45-70	30-60	15-25	NP-5
	10-24	Very gravelly clay loam	GC	A-2, A-6	0	0-15	30-55	25-50	20-50	15-45	30-35	10-15
	24-35	Very gravelly loam	GM	A-2, A-1	0	0-15	35-60	25-50	20-45	15-40	15-25	NP-5
	35-60	Extremely gravelly loam	GM, GP-GM	A-2, A-1, A-4	0	15-30	20-45	10-30	10-25	5-20	15-25	NP-5
110:												
Turrah----------	0-4	Silty clay loam	CL	A-6	0	0	100	100	90-100	85-95	30-40	10-20
	4-12	Clay, silty clay, silty clay loam	CL, CH	A-7, A-6	0	0	100	100	90-100	75-95	35-65	15-45
	12-38	Clay, silty clay, silty clay loam	CL, CH	A-7, A-6	0	0	100	100	90-100	75-95	35-65	15-45
	38-60	Very gravelly sandy clay loam, very gravelly clay loam	GC	A-2	0	0	35-60	25-50	20-45	10-30	30-40	10-20
111:												
Udifluvents.												
112:												
Udorthents.												

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
112:												
Glaciercreek----	0-14	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	55-70	40-60	20-25	NP-5
	14-60	Extremely gravelly coarse sand, extremely gravelly loamy sand, extremely cobbly sand	GP, GP-GM	A-1	0	10-45	20-50	10-30	5-20	0-10	---	NP
113:												
Upsata----------	0-6	Gravelly fine sandy loam	SM, GM	A-4, A-2, A-1	0	0-10	60-85	55-75	40-65	20-40	30-40	NP-10
	6-14	Gravelly fine sandy loam	SM, GM	A-4, A-2, A-1	0	0-10	60-85	55-75	40-65	20-40	30-40	NP-10
	14-60	Extremely gravelly loamy coarse sand, extremely gravelly loamy sand, extremely gravelly sand	GP	A-1	0	25-40	20-50	10-35	5-25	0-5	---	NP
114:												
Urban land.												
115:												
Waldbillig------	0-10	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	10-26	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	26-60	Very gravelly fine sandy loam, very gravelly sandy loam, very gravelly loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10
116:												
Waldbillig------	0-10	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	10-26	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	26-60	Very gravelly fine sandy loam, very gravelly sandy loam, very	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
117:												
Waldbillig------	0-10	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	10-26	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	26-60	Very gravelly fine sandy loam, very gravelly sandy loam, very gravelly loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10
Auggie----------	0-6	Silt loam	CL-ML, ML	A-4	0	0	95-100	85-100	85-95	85-95	20-30	NP-10
	6-20	Silty clay loam	CL	A-6	0	0	90-100	85-100	85-95	85-95	30-40	10-15
	20-60	Silty clay loam	CL	A-6	0	0	90-100	85-100	85-95	85-90	30-40	10-15
118:												
Waldbillig------	0-10	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	10-26	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	26-60	Very gravelly fine sandy loam, very gravelly sandy loam, very gravelly loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10
Holloway--------	0-10	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	10-17	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	17-52	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	52-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
119:												
Waldbillig------	0-10	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	10-26	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	26-60	Very gravelly fine sandy loam, very gravelly sandy loam, very gravelly loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10
Holloway--------	0-10	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	10-17	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	17-52	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	52-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5
120:												
Waldbillig------	0-11	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	11-25	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	25-60	Very gravelly fine sandy loam, very gravelly sandy loam, very gravelly loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
120:												
Holloway--------	0-11	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	11-21	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	21-45	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	45-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5
121:												
Waldbillig------	0-11	Gravelly silt loam	ML, GM	A-4	0	0-15	65-80	60-75	50-65	40-55	25-35	NP-10
	11-25	Very gravelly fine sandy loam, very gravelly sandy loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-15	40-65	30-55	20-40	10-25	20-30	NP-10
	25-60	Very gravelly fine sandy loam, very gravelly sandy loam, very gravelly loam	GM, GM-GC, SM, SM-SC	A-2, A-1	0	10-30	45-65	35-55	25-40	15-30	20-30	NP-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
121:												
Holloway----------	0-11	Gravelly silt loam	ML, GM	A-4	0	5-15	65-80	60-75	55-70	40-65	30-40	NP-10
	11-21	Extremely gravelly fine sandy loam, very gravelly loam, extremely gravelly sandy loam	GM	A-1	0	0-25	25-50	20-40	15-35	10-25	15-25	NP-5
	21-45	Extremely gravelly fine sandy loam, extremely gravelly sandy loam, extremely gravelly loam	GP-GM, GM	A-1	0	10-25	20-35	15-30	10-25	5-20	15-25	NP-5
	45-60	Extremely gravelly sandy loam, extremely gravelly loamy sand	GP-GM	A-1	0	10-30	15-35	10-30	10-20	5-10	15-25	NP-5
122:												
Whitore---------	0-8	Gravelly clay loam	GC, CL	A-6	0	0-10	60-80	55-75	50-75	40-60	30-40	10-15
	8-60	Very cobbly clay loam, extremely cobbly loam, very channery clay loam	GM-GC, GC	A-4, A-6, A-2	0	25-55	35-70	30-65	25-65	20-50	25-35	5-15
123:												
Whitore---------	0-8	Gravelly clay loam	GC, CL	A-6	0	0-10	60-80	55-75	50-75	40-60	30-40	10-15
	8-60	Very cobbly clay loam, extremely cobbly loam, very channery clay loam	GM-GC, GC	A-4, A-6, A-2	0	25-55	35-70	30-65	25-65	20-50	25-35	5-15
124:												
Wildgen---------	0-6	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-15	65-75	60-70	50-65	35-55	25-30	5-10
	6-19	Very gravelly loam, gravelly loam	CL-ML, GM-GC	A-4, A-2	0	0-25	50-75	45-70	40-65	25-55	25-30	5-10
	19-60	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam	GM, GM-GC	A-2, A-4, A-1	0	10-40	45-60	40-55	25-50	10-40	20-30	NP-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
125:												
Wildgen	0-6	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-15	65-75	60-70	50-65	35-55	25-30	5-10
	6-19	Very gravelly loam, gravelly loam	CL-ML, GM-GC	A-4, A-2	0	0-25	50-75	45-70	40-65	25-55	25-30	5-10
	19-60	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam	GM, GM-GC	A-2, A-4, A-1	0	10-40	45-60	40-55	25-50	10-40	20-30	NP-10
Winkler	0-4	Gravelly loam	GM, ML	A-4	0	0-5	60-80	55-75	50-70	35-55	15-25	NP-5
	4-21	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	21-60	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
126:												
Wildgen	0-6	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-15	65-75	60-70	50-65	35-55	25-30	5-10
	6-19	Very gravelly loam, gravelly loam	CL-ML, GM-GC	A-4, A-2	0	0-25	50-75	45-70	40-65	25-55	25-30	5-10
	19-60	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam	GM, GM-GC	A-2, A-4, A-1	0	10-40	45-60	40-55	25-50	10-40	20-30	NP-10
Winkler	0-4	Gravelly loam	GM, ML	A-4	0	0-5	60-80	55-75	50-70	35-55	15-25	NP-5
	4-21	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	21-60	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
127:												
Wildgen	0-3	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-15	65-75	60-70	50-65	35-55	25-30	5-10
	3-19	Very gravelly loam, gravelly loam	CL-ML, GM-GC	A-4, A-2	0	0-25	50-75	45-70	40-65	25-55	25-30	5-10
	19-60	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam	GM, GM-GC	A-2, A-4, A-1	0	10-40	45-60	40-55	25-50	10-40	20-30	NP-10
Winkler	0-3	Very gravelly sandy loam	GM, SM	A-1	0	0-10	40-60	30-50	20-35	10-20	15-25	NP-5
	3-25	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	25-42	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	42-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5
128:												
Wildgen	0-3	Gravelly loam	CL-ML, GM-GC, SM-SC	A-4	0	0-15	65-75	60-70	50-65	35-55	25-30	5-10
	3-19	Very gravelly loam, gravelly loam	CL-ML, GM-GC	A-4, A-2	0	0-25	50-75	45-70	40-65	25-55	25-30	5-10
	19-60	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam	GM, GM-GC	A-2, A-4, A-1	0	10-40	45-60	40-55	25-50	10-40	20-30	NP-10

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
128: Winkler---------	0-3	Very gravelly sandy loam	GM, SM	A-1	0	0-10	40-60	30-50	20-35	10-20	15-25	NP-5
	3-25	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	25-42	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	42-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5
129: Winfall---------	0-18	Gravelly loam	GM, GM-GC, ML, CL-ML	A-2, A-4	0	0-5	55-85	50-80	45-75	30-60	20-30	NP-10
	18-60	Very gravelly loam, very gravelly sandy loam, very gravelly fine sandy loam	GM, GM-GC	A-1, A-2	0	0-25	45-60	35-50	25-40	15-30	20-30	NP-10
130: Winkler---------	0-8	Very gravelly sandy loam	GM, SM	A-1	0	0-10	40-60	30-50	20-35	10-20	15-25	NP-5
	8-25	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	25-42	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	42-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
131:												
Winkler	0-8	Very gravelly sandy loam	GM, SM	A-1	0	0-10	40-60	30-50	20-35	10-20	15-25	NP-5
	8-25	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	25-42	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	42-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5
132:												
Winkler	0-4	Gravelly loam	GM, ML	A-4	0	0-5	60-80	55-75	50-70	35-55	15-25	NP-5
	4-21	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	21-40	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	40-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5
133:												
Winkler	0-4	Gravelly loam	GM, ML	A-4	0	0-5	60-80	55-75	50-70	35-55	15-25	NP-5
	4-21	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	21-40	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	40-60	Extremely gravelly sandy loam, extremely gravelly fine	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Rock fragments: >10 inches	Rock fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
134:												
Winkler	0-8	Very gravelly sandy loam	GM, SM	A-1	0	0-10	40-60	30-50	20-35	10-20	15-25	NP-5
	8-30	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	30-47	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	47-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5
Rubble land.												
135:												
Winkler	0-4	Gravelly loam	GM, ML	A-4	0	0-5	60-80	55-75	50-70	35-55	15-25	NP-5
	4-21	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, SM, SP-SM	A-1	0	0-15	25-60	15-50	10-35	5-20	15-25	NP-5
	21-40	Extremely gravelly sandy loam, extremely gravelly loam	GM, GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-20	15-25	NP-5
	40-60	Extremely gravelly sandy loam, extremely gravelly fine sandy loam	GP-GM	A-1	0	15-40	20-40	10-30	10-25	5-10	15-25	NP-5
Rock outcrop.												
136:												
Xerofluvents.												

ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Rock fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
137:												
Yourame----------	0-4	Gravelly loam	ML, SM, GM	A-4	0	0-5	60-80	55-75	45-70	35-60	15-25	NP-5
	4-21	Gravelly loam, gravelly sandy loam	GM, SM	A-2, A-4	0	0-15	65-85	60-75	50-65	30-50	15-25	NP-5
	21-48	Very gravelly clay loam, very gravelly sandy clay loam, very cobbly clay loam	GM-GC, GC	A-2, A-4	0	10-30	40-60	35-55	30-50	20-40	25-40	5-15
	48-60	Very gravelly clay loam, very gravelly loam, very cobbly loam	GM-GC, GC	A-2, A-4	0	10-30	40-60	35-55	30-50	20-40	25-35	5-15

PHYSICAL PROPERTIES OF THE SOILS

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
1:											
Alberton	0-9	5-18	1.25-1.45	2.00-6.00	0.16-0.20	Low	1.0-3.0	0.32	0.32	3	3
	9-16	5-18	1.35-1.60	2.00-6.00	0.13-0.16	Low	1.0-2.0	0.20	---		
	16-30	5-18	1.35-1.60	2.00-6.00	0.12-0.15	Low	0.5-1.0	0.20	---		
	30-60	5-10	1.45-1.65	6.00-20.00	0.08-0.10	Low	0.0-0.5	0.17	---		
2:											
Ambrant	0-4	5-15	1.20-1.40	2.00-6.00	0.09-0.11	Low	3.0-5.0	0.10	0.20	3	3
	4-20	5-15	1.50-1.70	2.00-6.00	0.05-0.07	Low	1.0-2.0	0.10	---		
	20-39	5-18	1.45-1.70	2.00-6.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	39-60	0-5	1.50-1.70	6.00-20.00	0.03-0.04	Low	0.0-0.5	0.05	---		
3:											
Ambrant	0-4	5-15	1.20-1.40	2.00-6.00	0.09-0.11	Low	3.0-5.0	0.10	0.20	3	3
	4-20	5-15	1.50-1.70	2.00-6.00	0.05-0.07	Low	1.0-2.0	0.10	---		
	20-39	5-18	1.45-1.70	2.00-6.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	39-60	0-5	1.50-1.70	6.00-20.00	0.03-0.04	Low	0.0-0.5	0.05	---		
Rochester	0-7	0-10	1.20-1.40	6.00-20.00	0.09-0.10	Low	2.0-4.0	0.10	0.20	5	3
	7-12	0-10	1.45-1.65	6.00-20.00	0.04-0.05	Low	0.5-1.0	0.10	---		
	12-60	0-10	1.50-1.70	6.00-20.00	0.03-0.04	Low	0.0-0.5	0.05	---		
Rock outcrop.											
4:											
Aquic Haploxerolls.											
5:											
Aquic Udorthents.											
6:											
Aquolls.											
Aquepts.											
7:											
Argixerolls.											
Haploxerolls.											
8:											
Argixerolls.											
Haploxerolls.											
9:											
Argixerolls.											
Haploxerolls.											
10:											
Argixerolls.											
Haploxerolls.											

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
11:											
Auggie----------	0-6	10-20	1.10-1.30	0.60-2.00	0.18-0.22	Low	2.0-5.0	0.37	0.37	5	5
	6-20	27-35	1.30-1.50	0.20-0.60	0.16-0.20	Moderate	1.0-2.0	0.32	---		
	20-45	27-35	1.30-1.50	0.20-0.60	0.16-0.20	Moderate	0.5-1.0	0.32	---		
	45-60	10-20	1.30-1.50	0.60-2.00	0.16-0.20	Low	0.0-0.5	0.37	---		
12:											
Bata------------	0-10	10-20	0.80-0.95	0.60-2.00	0.11-0.13	Low	5.0-10	0.20	0.37	5	5
	10-22	12-25	1.15-1.40	0.60-2.00	0.07-0.09	Low	0.5-1.0	0.15	---		
	22-60	20-35	1.35-1.60	0.20-0.60	0.07-0.09	Moderate	0.0-0.5	0.17	---		
13:											
Bata------------	0-9	10-20	0.80-0.95	0.60-2.00	0.11-0.13	Low	5.0-10	0.20	0.37	5	5
	9-20	12-25	1.15-1.40	0.60-2.00	0.07-0.09	Low	0.5-1.0	0.15	---		
	20-60	20-35	1.35-1.60	0.20-0.60	0.07-0.09	Moderate	0.0-0.5	0.17	---		
Waldbillig------	0-10	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-26	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	26-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
14:											
Beeskove--------	0-8	7-15	1.25-1.45	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.20	0.37	5	5
	8-20	5-15	1.35-1.60	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	20-27	5-15	1.35-1.60	0.60-2.00	0.07-0.08	Low	0.5-1.0	0.10	---		
	27-60	5-15	1.45-1.65	0.60-2.00	0.05-0.06	Low	0.0-0.5	0.05	---		
15:											
Beeskove--------	0-8	7-15	1.25-1.45	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.20	0.37	5	5
	8-20	5-15	1.35-1.60	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	20-27	5-15	1.35-1.60	0.60-2.00	0.07-0.08	Low	0.5-1.0	0.10	---		
	27-60	5-15	1.45-1.65	0.60-2.00	0.05-0.06	Low	0.0-0.5	0.05	---		
Rock outcrop.											
16:											
Bigarm----------	0-11	7-18	1.15-1.35	0.60-2.00	0.13-0.16	Low	2.0-4.0	0.15	0.37	5	5
	11-15	5-18	1.30-1.50	2.00-6.00	0.08-0.09	Low	1.0-2.0	0.15	---		
	15-40	5-18	1.30-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.15	---		
	40-60	5-18	1.35-1.60	2.00-6.00	0.05-0.06	Low	0.0-0.5	0.10	---		
17:											
Bigarm----------	0-11	7-18	1.15-1.35	0.60-2.00	0.13-0.16	Low	2.0-4.0	0.15	0.37	5	5
	11-15	5-18	1.30-1.50	2.00-6.00	0.08-0.09	Low	1.0-2.0	0.15	---		
	15-40	5-18	1.30-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.15	---		
	40-60	5-18	1.35-1.60	2.00-6.00	0.05-0.06	Low	0.0-0.5	0.10	---		
18:											
Bigarm----------	0-11	7-18	1.15-1.35	0.60-2.00	0.13-0.16	Low	2.0-4.0	0.15	0.37	5	5
	11-15	5-18	1.30-1.50	2.00-6.00	0.08-0.09	Low	1.0-2.0	0.15	---		
	15-40	5-18	1.30-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.15	---		
	40-60	5-18	1.35-1.60	2.00-6.00	0.05-0.06	Low	0.0-0.5	0.10	---		
19:											
Bigarm----------	0-11	7-18	1.15-1.35	0.60-2.00	0.13-0.16	Low	2.0-4.0	0.15	0.37	5	5
	11-15	5-18	1.30-1.50	2.00-6.00	0.08-0.09	Low	1.0-2.0	0.15	---		
	15-40	5-18	1.30-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.15	---		
	40-60	5-18	1.35-1.60	2.00-6.00	0.05-0.06	Low	0.0-0.5	0.10	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
20:											
Bigarm----------	0-11	7-18	1.15-1.35	0.60-2.00	0.13-0.16	Low	2.0-4.0	0.15	0.37	5	5
	11-15	5-18	1.30-1.50	2.00-6.00	0.08-0.09	Low	1.0-2.0	0.15	---		
	15-40	5-18	1.30-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.15	---		
	40-60	5-18	1.35-1.60	2.00-6.00	0.05-0.06	Low	0.0-0.5	0.10	---		
Rock outcrop.											
21:											
Biglake---------	0-9	5-15	1.20-1.40	2.00-6.00	0.09-0.11	Low	2.0-4.0	0.15	0.20	2	3
	9-16	5-10	1.40-1.60	2.00-6.00	0.07-0.08	Low	0.5-2.0	0.10	---		
	16-60	0-10	1.50-1.70	6.00-20.00	0.02-0.03	Low	0.0-0.5	0.05	---		
22:											
Biglake---------	0-9	5-15	1.20-1.40	2.00-6.00	0.09-0.11	Low	2.0-4.0	0.15	0.20	2	3
	9-16	5-10	1.40-1.60	2.00-6.00	0.07-0.08	Low	0.5-2.0	0.10	---		
	16-60	0-10	1.50-1.70	6.00-20.00	0.02-0.03	Low	0.0-0.5	0.05	---		
23:											
Bignell---------	0-11	10-20	1.25-1.45	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.24	0.37	5	5
	11-15	10-25	1.40-1.60	0.60-2.00	0.08-0.10	Low	0.5-2.0	0.15	---		
	15-60	35-60	1.40-1.65	0.06-0.20	0.07-0.09	Moderate	0.5-1.0	0.10	---		
24:											
Bignell---------	0-12	10-20	1.25-1.45	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.24	0.37	5	5
	12-22	10-25	1.40-1.60	0.60-2.00	0.08-0.10	Low	0.5-2.0	0.15	---		
	22-60	35-60	1.40-1.65	0.06-0.20	0.07-0.09	Moderate	0.5-1.0	0.10	---		
Winkler---------	0-4	7-15	1.20-1.40	2.00-6.00	0.07-0.09	Low	2.0-4.0	0.02	0.20	5	3
	4-21	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	21-40	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	40-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
25:											
Bignell---------	0-11	10-20	1.25-1.45	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.24	0.37	5	5
	11-15	10-25	1.40-1.60	0.60-2.00	0.08-0.10	Low	0.5-2.0	0.15	---		
	15-60	35-60	1.40-1.65	0.06-0.20	0.07-0.09	Moderate	0.5-1.0	0.10	---		
Winkler---------	0-8	7-15	1.20-1.40	2.00-6.00	0.07-0.09	Low	2.0-4.0	0.02	0.20	5	3
	8-25	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	25-42	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	42-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
26:											
Borohemists.											
27:											
Chickaman-------	0-9	5-8	0.70-0.95	0.60-2.00	0.18-0.22	Low	2.0-4.0	0.32	0.32	5	5
	9-30	5-10	1.20-1.45	0.60-2.00	0.13-0.17	Low	0.5-1.0	0.32	---		
	30-60	5-10	1.25-1.50	0.60-2.00	0.10-0.12	Low	0.0-0.5	0.28	---		
28:											
Chickaman-------	0-9	5-8	0.70-0.95	0.60-2.00	0.18-0.22	Low	2.0-4.0	0.32	0.32	5	5
	9-30	5-10	1.20-1.45	0.60-2.00	0.13-0.17	Low	0.5-1.0	0.32	---		
	30-60	5-10	1.25-1.50	0.60-2.00	0.10-0.12	Low	0.0-0.5	0.28	---		
29:											
Coerock---------	0-15	7-15	0.65-0.85	0.60-2.00	0.10-0.12	Low	1.0-4.0	0.10	0.37	1	5
	15-18	7-15	0.65-0.85	0.60-2.00	0.09-0.11	Low	1.0-2.0	0.20	---		
	18-60	---	---	---	---	---	---	---	---		
Rock outcrop.											

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
30:											
Coerock----------	0-15	7-15	0.65-0.85	0.60-2.00	0.10-0.12	Low	1.0-4.0	0.10	0.37	1	5
	15-18	7-15	0.65-0.85	0.60-2.00	0.09-0.11	Low	1.0-2.0	0.20	---		
	18-60	---	---	---	---	---	---	---	---		
Rock outcrop.											
31:											
Courville-------	0-10	7-15	0.85-1.00	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-27	5-18	1.30-1.55	0.60-2.00	0.09-0.11	Low	0.5-2.0	0.10	---		
	27-60	10-25	1.30-1.55	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
32:											
Courville-------	0-10	7-15	0.85-1.00	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-27	5-18	1.30-1.55	0.60-2.00	0.09-0.11	Low	0.5-2.0	0.10	---		
	27-60	10-25	1.30-1.55	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
Mitten----------	0-9	5-10	0.65-0.95	0.60-2.00	0.14-0.17	Low	2.0-4.0	0.15	0.37	5	5
	9-16	5-10	1.35-1.60	2.00-6.00	0.06-0.08	Low	1.0-2.0	0.10	---		
	16-34	5-10	1.35-1.60	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	34-60	5-10	1.40-1.65	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
33:											
Crow------------	0-4	10-20	1.25-1.65	0.20-0.60	0.18-0.21	Low	2.0-5.0	0.37	0.37	5	5
	4-10	20-40	1.25-1.65	0.20-0.60	0.15-0.18	Moderate	1.0-3.0	0.37	---		
	10-48	40-60	1.25-1.45	0.06-0.20	0.14-0.17	High	0.5-1.0	0.32	---		
	48-60	20-35	1.45-1.65	0.20-0.60	0.12-0.15	Moderate	0.0-0.5	0.32	---		
34:											
Desmet----------	0-7	10-18	1.10-1.30	0.60-2.00	0.16-0.18	Low	2.0-4.0	0.32	0.32	5	5
	7-15	10-18	1.25-1.50	0.60-2.00	0.15-0.17	Low	1.0-2.0	0.37	---		
	15-24	10-18	1.25-1.50	0.60-2.00	0.15-0.17	Low	0.5-1.0	0.37	---		
	24-39	10-18	1.30-1.50	0.60-2.00	0.14-0.17	Low	0.5-1.0	0.37	---		
	39-60	10-18	1.30-1.50	0.60-2.00	0.13-0.15	Low	0.0-0.5	0.32	---		
35:											
Elkner----------	0-7	5-10	1.20-1.40	2.00-6.00	0.13-0.15	Low	3.0-5.0	0.15	0.20	3	3
	7-20	5-10	1.35-1.60	2.00-6.00	0.10-0.12	Low	1.0-2.0	0.10	---		
	20-36	5-10	1.40-1.65	2.00-6.00	0.07-0.08	Low	0.5-1.0	0.05	---		
	36-60	0-5	1.40-1.65	6.00-20.00	0.04-0.05	Low	0.0-0.5	0.02	---		
Ovando----------	0-6	5-10	1.30-1.50	2.00-6.00	0.10-0.12	Low	1.0-3.0	0.02	0.20	5	3
	6-25	0-5	1.50-1.65	6.00-20.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	25-49	0-5	1.50-1.65	6.00-20.00	0.02-0.03	Low	0.0-0.5	0.05	---		
	49-60	0-5	1.55-1.75	6.00-20.00	0.01-0.02	Low	0.0-0.5	0.02	---		
36:											
Evaro-----------	0-4	7-15	0.75-0.95	2.00-6.00	0.12-0.15	Low	2.0-4.0	0.17	0.37	5	5
	4-16	5-15	1.40-1.60	2.00-6.00	0.06-0.07	Low	0.5-1.0	0.15	---		
	16-60	5-18	1.45-1.65	2.00-6.00	0.05-0.06	Low	0.0-0.5	0.05	---		
37:											
Evaro-----------	0-4	7-15	0.75-0.95	2.00-6.00	0.12-0.15	Low	2.0-4.0	0.17	0.37	5	5
	4-16	5-15	1.40-1.60	2.00-6.00	0.06-0.07	Low	0.5-1.0	0.15	---		
	16-60	5-18	1.45-1.65	2.00-6.00	0.05-0.06	Low	0.0-0.5	0.05	---		
38:											
Felan-----------	0-8	10-20	0.85-0.95	0.60-2.00	0.15-0.17	Low	3.0-6.0	0.15	0.37	5	6
	8-33	10-20	1.25-1.50	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.32	---		
	33-60	10-20	1.30-1.55	0.60-2.00	0.09-0.11	Low	0.0-0.5	0.32	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
39:											
Felan-----------	0-8	10-20	0.85-0.95	0.60-2.00	0.15-0.17	Low	3.0-6.0	0.15	0.37	5	6
	8-33	10-20	1.25-1.50	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.32	---		
	33-60	10-20	1.30-1.55	0.60-2.00	0.09-0.11	Low	0.0-0.5	0.32	---		
40:											
Felan-----------	0-12	10-20	0.85-0.95	0.60-2.00	0.15-0.17	Low	3.0-6.0	0.15	0.37	3	6
	12-40	10-20	1.25-1.50	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.32	---		
	40-60	10-20	1.30-1.55	0.60-2.00	0.09-0.11	Low	0.0-0.5	0.32	---		
41:											
Felan-----------	0-12	10-20	0.85-0.95	0.60-2.00	0.15-0.17	Low	3.0-6.0	0.15	0.37	3	6
	12-40	10-20	1.25-1.50	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.32	---		
	40-60	10-20	1.30-1.55	0.60-2.00	0.09-0.11	Low	0.0-0.5	0.32	---		
42:											
Glaciercreek----	0-14	5-15	0.85-1.00	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.17	0.37	2	5
	14-60	0-10	1.50-1.65	>20.00	0.01-0.02	Low	0.0-0.5	0.02	---		
43:											
Glaciercreek variant--------	0-9	5-15	1.25-1.45	2.00-6.00	0.14-0.17	Low	1.0-3.0	0.20	0.20	4	3
	9-32	5-15	1.35-1.60	2.00-6.00	0.13-0.16	Low	0.5-1.0	0.20	---		
	32-60	5-15	1.45-1.65	2.00-6.00	0.04-0.06	Low	0.0-0.5	0.10	---		
Glaciercreek----	0-14	5-15	0.85-1.00	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.17	0.37	2	5
	14-60	0-10	1.50-1.65	>20.00	0.01-0.02	Low	0.0-0.5	0.02	---		
44:											
Grantsdale------	0-9	10-18	1.05-1.30	0.60-2.00	0.16-0.20	Low	3.0-5.0	0.28	0.28	3	5
	9-17	10-18	1.25-1.50	0.60-2.00	0.15-0.19	Low	1.0-3.0	0.37	---		
	17-32	10-18	1.25-1.50	0.60-2.00	0.13-0.16	Low	0.5-1.0	0.37	---		
	32-60	5-10	1.55-1.75	6.00-20.00	0.03-0.04	Low	0.0-0.5	0.05	---		
45:											
Grassvalley-----	0-9	30-40	1.15-1.35	0.06-0.20	0.16-0.20	Moderate	1.0-3.0	0.43	0.43	5	7
	9-21	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	1.0-2.0	0.37	---		
	21-28	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	0.5-1.0	0.37	---		
	28-60	35-60	1.30-1.55	0.00-0.06	0.14-0.16	Moderate	0.0-0.5	0.37	---		
46:											
Grassvalley-----	0-9	30-40	1.15-1.35	0.06-0.20	0.16-0.20	Moderate	1.0-3.0	0.43	0.43	5	7
	9-23	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	1.0-2.0	0.37	---		
	23-39	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	0.5-1.0	0.37	---		
	39-60	35-60	1.30-1.55	0.00-0.06	0.14-0.16	Moderate	0.0-0.5	0.37	---		
47:											
Grassvalley-----	0-7	30-40	1.15-1.35	0.06-0.20	0.16-0.20	Moderate	1.0-3.0	0.43	0.43	5	7
	7-24	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	1.0-2.0	0.37	---		
	24-52	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	0.5-1.0	0.37	---		
	52-60	35-60	1.30-1.55	0.00-0.06	0.14-0.16	Moderate	0.0-0.5	0.37	---		
48:											
Grassvalley-----	0-7	30-40	1.15-1.35	0.06-0.20	0.16-0.20	Moderate	1.0-3.0	0.43	0.43	5	7
	7-24	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	1.0-2.0	0.37	---		
	24-52	40-60	1.25-1.50	0.00-0.06	0.14-0.16	Moderate	0.5-1.0	0.37	---		
	52-60	35-60	1.30-1.55	0.00-0.06	0.14-0.16	Moderate	0.0-0.5	0.37	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
49:											
Greenough--------	0-8	5-20	1.20-1.45	0.60-2.00	0.18-0.22	Low	0.5-2.0	0.37	0.37	5	5
	8-22	5-20	1.30-1.50	0.60-2.00	0.18-0.22	Low	0.5-1.0	0.37	---		
	22-49	18-32	1.30-1.50	0.20-0.60	0.16-0.20	Moderate	0.0-0.5	0.32	---		
	49-60	18-32	1.30-1.55	0.20-0.60	0.14-0.18	Moderate	0.0-0.5	0.28	---		
50:											
Hagstadt---------	0-5	20-27	1.10-1.30	0.60-2.00	0.16-0.20	Low	2.0-5.0	0.32	0.32	3	6
	5-21	27-35	1.30-1.50	0.20-0.60	0.10-0.12	Moderate	0.5-2.0	0.32	---		
	21-60	---	---	---	---	---	---	---	---		
51:											
Half Moon--------	0-7	15-25	1.15-1.35	0.60-2.00	0.18-0.22	Low	1.0-3.0	0.37	0.37	5	6
	7-18	25-35	1.30-1.50	0.20-0.60	0.16-0.20	Moderate	0.5-1.0	0.32	---		
	18-60	20-30	1.30-1.50	0.20-0.60	0.16-0.20	Low	0.0-0.5	0.37	---		
52:											
Hanaker----------	0-15	10-20	1.15-1.35	0.60-2.00	0.18-0.22	Low	1.0-3.0	0.37	0.37	5	4
	15-25	27-35	1.15-1.35	0.20-0.60	0.18-0.20	Moderate	1.0-2.0	0.32	---		
	25-32	18-27	1.30-1.50	0.20-0.60	0.18-0.20	Low	0.5-1.0	0.37	---		
	32-42	10-20	1.30-1.50	0.60-2.00	0.17-0.19	Low	0.0-0.5	0.32	---		
	42-60	15-27	1.40-1.65	0.60-2.00	0.10-0.12	Low	0.0-0.5	0.17	---		
53:											
Hollandlake------	0-4	10-18	1.20-1.40	0.60-2.00	0.12-0.15	Low	1.0-3.0	0.20	0.37	5	5
	4-12	15-27	1.30-1.55	0.60-2.00	0.12-0.15	Low	0.5-1.0	0.20	---		
	12-22	20-30	1.40-1.60	0.20-0.60	0.07-0.09	Moderate	0.5-1.0	0.15	---		
	22-60	25-35	1.40-1.65	0.20-0.60	0.07-0.08	Moderate	0.0-0.5	0.10	---		
54:											
Hollandlake------	0-4	10-18	1.20-1.40	0.60-2.00	0.12-0.15	Low	1.0-3.0	0.20	0.37	5	5
	4-12	15-27	1.30-1.55	0.60-2.00	0.12-0.15	Low	0.5-1.0	0.20	---		
	12-22	20-30	1.40-1.60	0.20-0.60	0.07-0.09	Moderate	0.5-1.0	0.15	---		
	22-60	25-35	1.40-1.65	0.20-0.60	0.07-0.08	Moderate	0.0-0.5	0.10	---		
Bata-------------	0-9	10-20	0.80-0.95	0.60-2.00	0.11-0.13	Low	5.0-10	0.20	0.37	5	5
	9-20	12-25	1.15-1.40	0.60-2.00	0.07-0.09	Low	0.5-1.0	0.15	---		
	20-60	20-35	1.35-1.60	0.20-0.60	0.07-0.09	Moderate	0.0-0.5	0.17	---		
55:											
Hollandlake------	0-4	10-18	1.20-1.40	0.60-2.00	0.12-0.15	Low	1.0-3.0	0.20	0.37	5	6
	4-12	15-27	1.30-1.55	0.60-2.00	0.12-0.15	Low	0.5-1.0	0.20	---		
	12-22	20-30	1.40-1.60	0.20-0.60	0.07-0.09	Moderate	0.5-1.0	0.15	---		
	22-60	25-35	1.40-1.65	0.20-0.60	0.07-0.08	Moderate	0.0-0.5	0.10	---		
Bata-------------	0-9	10-20	0.80-0.95	0.60-2.00	0.11-0.13	Low	5.0-10	0.20	0.37	5	5
	9-20	12-25	1.15-1.40	0.60-2.00	0.07-0.09	Low	0.5-1.0	0.15	---		
	20-60	20-35	1.35-1.60	0.20-0.60	0.07-0.09	Moderate	0.0-0.5	0.17	---		
56:											
Holloway---------	0-10	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	10-17	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	17-52	5-15	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	52-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
57:											
Holloway---------	0-10	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	10-17	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	17-52	5-15	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	52-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
58:											
Holloway--------	0-11	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	11-21	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	21-45	5-15	1.30-1.55	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	45-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
59:											
Holloway--------	0-11	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	11-21	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	21-45	5-15	1.30-1.55	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	45-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
60:											
Holloway--------	0-10	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	10-17	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	17-52	5-15	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	52-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
Rock outcrop.											
61:											
Jimlake---------	0-7	7-15	0.85-0.95	0.60-2.00	0.14-0.18	Low	2.0-4.0	0.17	0.37	5	5
	7-14	10-18	1.20-1.45	0.60-2.00	0.13-0.17	Low	1.0-2.0	0.20	---		
	14-38	13-20	1.35-1.60	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.15	---		
	38-60	10-18	1.35-1.60	0.60-2.00	0.09-0.11	Low	0.0-0.5	0.15	---		
62:											
Jimlake---------	0-7	7-15	0.85-0.95	0.60-2.00	0.14-0.18	Low	2.0-4.0	0.17	0.37	5	5
	7-14	10-18	1.20-1.45	0.60-2.00	0.13-0.17	Low	1.0-2.0	0.20	---		
	14-38	13-20	1.35-1.60	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.15	---		
	38-60	10-18	1.35-1.60	0.60-2.00	0.09-0.11	Low	0.0-0.5	0.15	---		
63:											
Lantern---------	0-14	5-15	1.25-1.45	2.00-6.00	0.10-0.12	Low	1.0-3.0	0.10	0.20	5	3
	14-26	5-15	1.35-1.60	2.00-6.00	0.09-0.10	Low	0.5-1.0	0.10	---		
	26-39	5-18	1.45-1.70	2.00-6.00	0.09-0.10	Low	0.0-0.5	0.10	---		
	39-60	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
64:											
Lantern---------	0-14	5-15	1.25-1.45	2.00-6.00	0.10-0.12	Low	1.0-3.0	0.10	0.20	5	3
	14-26	5-15	1.35-1.60	2.00-6.00	0.09-0.10	Low	0.5-1.0	0.10	---		
	26-39	5-18	1.45-1.70	2.00-6.00	0.09-0.10	Low	0.0-0.5	0.10	---		
	39-60	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
65:											
Lantern---------	0-14	5-15	1.25-1.45	2.00-6.00	0.10-0.12	Low	1.0-3.0	0.10	0.20	5	3
	14-26	5-15	1.35-1.60	2.00-6.00	0.09-0.10	Low	0.5-1.0	0.10	---		
	26-39	5-18	1.45-1.70	2.00-6.00	0.09-0.10	Low	0.0-0.5	0.10	---		
	39-60	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
Rock outcrop.											
66:											
Lolopeak--------	0-9	7-12	0.85-0.95	2.00-6.00	0.12-0.15	Low	3.0-6.0	0.10	0.37	5	8
	9-27	0-5	1.50-1.75	6.00-20.00	0.01-0.02	Low	0.5-1.0	0.05	---		
	27-60	0-5	1.55-1.75	6.00-20.00	0.01-0.02	Low	0.0-0.5	0.05	---		
67:											
Lolopeak--------	0-9	7-12	0.85-0.95	2.00-6.00	0.12-0.15	Low	3.0-6.0	0.10	0.37	5	8
	9-27	0-5	1.50-1.75	6.00-20.00	0.01-0.02	Low	0.5-1.0	0.05	---		
	27-60	0-5	1.55-1.75	6.00-20.00	0.01-0.02	Low	0.0-0.5	0.05	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors			Wind erodi- bility group
								K	Kf	T	
	In	Pct	g/cc	In/hr	In/in		Pct				
67:											
Rock outcrop.											
68:											
Lubrecht	0-8	10-20	1.25-1.50	0.60-2.00	0.18-0.22	Low	0.5-2.0	0.43	0.43	3	5
	8-11	27-40	1.25-1.45	0.20-0.60	0.16-0.20	Moderate	0.5-1.0	0.37	---		
	11-30	40-60	1.30-1.50	0.06-0.20	0.14-0.18	High	0.5-1.0	0.32	---		
	30-36	27-40	1.35-1.55	0.06-0.20	0.14-0.18	Moderate	0.0-0.5	0.20	---		
	36-60	---	---	---	---	---	---	---	---		
69:											
Mitten	0-9	5-10	0.65-0.95	0.60-2.00	0.14-0.17	Low	2.0-4.0	0.17	0.37	5	5
	9-16	5-10	1.35-1.60	2.00-6.00	0.06-0.08	Low	1.0-2.0	0.10	---		
	16-34	5-10	1.35-1.60	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	34-60	5-10	1.40-1.65	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
70:											
Mitten	0-9	5-10	0.65-0.95	0.60-2.00	0.14-0.17	Low	2.0-4.0	0.17	0.37	5	5
	9-16	5-10	1.35-1.60	2.00-6.00	0.06-0.08	Low	1.0-2.0	0.10	---		
	16-34	5-10	1.35-1.60	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	34-60	5-10	1.40-1.65	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
Sharrott	0-7	10-15	1.20-1.40	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.20	0.37	1	5
	7-14	10-15	1.30-1.50	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.10	---		
	14-16	10-15	1.30-1.55	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.10	---		
	16-60	---	---	---	---	---	---	---	---		
71:											
Mitten	0-9	5-10	0.65-0.95	0.60-2.00	0.14-0.17	Low	2.0-4.0	0.17	0.37	5	5
	9-16	5-10	1.35-1.60	2.00-6.00	0.06-0.08	Low	1.0-2.0	0.10	---		
	16-34	5-10	1.35-1.60	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	34-60	5-10	1.40-1.65	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
Tevis	0-3	10-15	1.20-1.40	2.00-6.00	0.12-0.15	Low	0.5-2.0	0.17	0.37	5	5
	3-14	5-10	1.30-1.50	2.00-6.00	0.06-0.08	Low	0.5-2.0	0.10	---		
	14-22	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	22-60	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
72:											
Moiese	0-9	10-22	1.15-1.35	0.60-2.00	0.14-0.16	Low	2.0-4.0	0.15	0.37	3	5
	9-21	5-15	1.40-1.60	2.00-6.00	0.06-0.07	Low	0.5-1.0	0.05	---		
	21-60	0-5	1.40-1.60	6.00-20.00	0.03-0.04	Low	0.0-0.5	0.02	---		
73:											
Orthents.											
74:											
Ovando	0-6	5-10	1.30-1.50	2.00-6.00	0.10-0.12	Low	1.0-3.0	0.10	0.20	5	3
	6-25	0-5	1.50-1.65	6.00-20.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	25-49	0-5	1.50-1.65	6.00-20.00	0.02-0.03	Low	0.0-0.5	0.05	---		
	49-60	0-5	1.55-1.75	6.00-20.00	0.01-0.02	Low	0.0-0.5	0.02	---		
Elkner	0-7	5-10	1.20-1.40	2.00-6.00	0.13-0.15	Low	3.0-5.0	0.15	0.20	3	3
	7-20	5-10	1.35-1.60	2.00-6.00	0.10-0.12	Low	1.0-2.0	0.10	---		
	20-36	5-10	1.40-1.65	2.00-6.00	0.07-0.08	Low	0.5-1.0	0.05	---		
	36-60	0-5	1.40-1.65	6.00-20.00	0.04-0.05	Low	0.0-0.5	0.02	---		
Rock outcrop.											

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
75:											
Perma-----------	0-12	7-20	1.30-1.50	0.60-2.00	0.12-0.14	Low	2.0-4.0	0.17	0.37	5	5
	12-36	7-20	1.40-1.60	0.60-2.00	0.08-0.09	Low	1.0-2.0	0.10	---		
	36-60	0-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
76:											
Perma-----------	0-10	7-20	1.30-1.50	0.60-2.00	0.12-0.14	Low	2.0-4.0	0.17	0.37	5	5
	10-38	7-20	1.40-1.60	0.60-2.00	0.08-0.09	Low	1.0-2.0	0.10	---		
	38-60	0-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
77:											
Perma-----------	0-7	7-20	1.30-1.50	0.60-2.00	0.12-0.14	Low	2.0-4.0	0.17	0.37	5	5
	7-38	7-20	1.40-1.60	0.60-2.00	0.08-0.09	Low	1.0-2.0	0.10	---		
	38-60	0-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
78:											
Perma variant---	0-12	15-25	1.10-1.30	0.60-2.00	0.16-0.20	Low	2.0-4.0	0.17	0.37	5	6
	12-33	27-35	1.35-1.60	0.20-0.60	0.08-0.10	Moderate	0.5-1.0	0.10	---		
	33-60	15-30	1.40-1.65	0.20-0.60	0.08-0.10	Moderate	0.0-0.5	0.10	---		
79:											
Perma variant---	0-12	15-25	1.10-1.30	0.60-2.00	0.16-0.20	Low	2.0-4.0	0.17	0.37	5	6
	12-33	27-35	1.35-1.60	0.20-0.60	0.08-0.10	Moderate	0.5-1.0	0.10	---		
	33-60	15-30	1.40-1.65	0.20-0.60	0.08-0.10	Moderate	0.0-0.5	0.10	---		
Perma-----------	0-7	7-20	1.30-1.50	0.60-2.00	0.12-0.14	Low	2.0-4.0	0.17	0.37	5	5
	7-38	7-20	1.40-1.60	0.60-2.00	0.08-0.09	Low	1.0-2.0	0.10	---		
	38-60	0-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
80:											
Petty-----------	0-12	7-15	0.85-0.95	0.60-2.00	0.12-0.15	Low	2.0-4.0	0.15	0.37	5	5
	12-24	5-15	1.45-1.65	2.00-6.00	0.05-0.06	Low	0.5-2.0	0.10	---		
	24-36	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.10	---		
	36-60	5-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
81:											
Petty-----------	0-12	7-15	0.85-0.95	0.60-2.00	0.12-0.15	Low	2.0-4.0	0.15	0.37	5	5
	12-24	5-15	1.45-1.65	2.00-6.00	0.05-0.06	Low	0.5-2.0	0.10	---		
	24-36	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.10	---		
	36-60	5-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
82:											
Petty-----------	0-8	7-15	0.85-0.95	0.60-2.00	0.12-0.15	Low	2.0-4.0	0.15	0.37	5	8
	8-18	5-15	1.45-1.65	2.00-6.00	0.05-0.06	Low	0.5-2.0	0.10	---		
	18-32	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.10	---		
	32-60	5-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
83:											
Petty-----------	0-9	7-15	0.85-0.95	0.60-2.00	0.12-0.15	Low	2.0-4.0	0.15	0.37	5	5
	9-31	5-15	1.45-1.65	2.00-6.00	0.05-0.06	Low	0.5-2.0	0.10	---		
	31-60	5-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
84:											
Petty-----------	0-9	7-15	0.85-0.95	0.60-2.00	0.12-0.15	Low	2.0-4.0	0.15	0.37	5	8
	9-30	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.10	---		
	30-60	5-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
85:											
Petty-----------	0-9	7-15	0.85-0.95	0.60-2.00	0.12-0.15	Low	2.0-4.0	0.15	0.37	5	8
	9-30	5-15	1.45-1.70	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.10	---		
	30-60	5-15	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
85:											
Rock outcrop.											
86:											
Phillcher-------	0-10	5-10	0.65-0.95	2.00-6.00	0.18-0.22	Low	1.0-3.0	0.32	0.32	3	5
	10-24	0-10	1.40-1.60	2.00-6.00	0.06-0.08	Low	0.5-1.0	0.10	---		
	24-60	0-10	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
87:											
Phillcher-------	0-10	5-10	0.65-0.95	2.00-6.00	0.18-0.22	Low	1.0-3.0	0.32	0.32	3	5
	10-24	0-10	1.40-1.60	2.00-6.00	0.06-0.08	Low	0.5-1.0	0.10	---		
	24-60	0-10	1.50-1.70	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
Rock outcrop.											
88:											
Pits.											
89:											
Repp------------	0-12	10-20	1.20-1.40	0.60-2.00	0.09-0.11	Low	2.0-4.0	0.05	0.37	5	5
	12-24	10-20	1.35-1.60	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	24-60	10-18	1.40-1.65	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.05	---		
90:											
Repp------------	0-9	10-20	1.20-1.40	0.60-2.00	0.09-0.11	Low	2.0-4.0	0.05	0.37	5	5
	9-24	10-20	1.35-1.60	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	24-60	10-18	1.40-1.65	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.05	---		
91:											
Repp------------	0-9	10-20	1.20-1.40	0.60-2.00	0.09-0.11	Low	2.0-4.0	0.05	0.37	5	5
	9-24	10-20	1.35-1.60	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	24-60	10-18	1.40-1.65	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.05	---		
92:											
Repp------------	0-12	10-20	1.20-1.40	0.60-2.00	0.09-0.11	Low	2.0-4.0	0.05	0.37	5	5
	12-24	10-20	1.35-1.60	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.15	---		
	24-60	10-18	1.40-1.65	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.05	---		
Rock outcrop.											
93:											
Riverwash.											
94:											
Rock outcrop.											
Rubble land.											
95:											
Rumblecreek-----	0-8	10-20	1.15-1.35	0.60-2.00	0.12-0.15	Low	2.0-5.0	0.17	0.37	5	5
	8-20	10-20	1.25-1.50	0.60-2.00	0.11-0.14	Low	1.0-2.0	0.20	---		
	20-32	20-35	1.30-1.55	0.20-0.60	0.07-0.08	Low	0.5-1.0	0.10	---		
	32-60	20-35	1.35-1.60	0.20-0.60	0.07-0.08	Low	0.0-0.5	0.10	---		
96:											
Selway----------	0-18	5-15	1.20-1.45	2.00-6.00	0.09-0.11	Low	1.0-3.0	0.10	0.20	3	3
	18-51	5-15	1.50-1.70	2.00-6.00	0.04-0.05	Low	0.5-1.0	0.05	---		
	51-60	5-10	1.55-1.75	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors			Wind erodi- bility group
								K	Kf	T	
	In	Pct	g/cc	In/hr	In/in		Pct				
97:											
Selway----------	0-18	5-15	1.20-1.45	2.00-6.00	0.09-0.11	Low	1.0-3.0	0.10	0.20	3	3
	18-51	5-15	1.50-1.70	2.00-6.00	0.04-0.05	Low	0.5-1.0	0.05	---		
	51-60	5-10	1.55-1.75	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
98:											
Selway----------	0-5	5-15	1.25-1.50	2.00-6.00	0.09-0.11	Low	1.0-3.0	0.10	0.20	5	8
	5-34	5-15	1.50-1.70	2.00-6.00	0.04-0.05	Low	0.5-1.0	0.05	---		
	34-60	5-10	1.55-1.75	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
99:											
Sharrott--------	0-4	10-15	1.20-1.40	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.20	0.37	1	5
	4-13	10-15	1.30-1.50	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.10	---		
	13-15	10-15	1.30-1.55	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.10	---		
	15-60	---	---	---	---	---	---	---	---		
Rock outcrop.											
100:											
Shooflin--------	0-12	10-20	1.15-1.40	0.60-2.00	0.18-0.22	Low	1.0-3.0	0.49	0.49	3	5
	12-51	60-80	1.25-1.50	0.00-0.06	0.13-0.17	High	0.5-2.0	0.32	---		
	51-60	---	---	---	---	---	---	---	---		
101:											
Tally variant---	0-10	5-15	1.30-1.65	2.00-6.00	0.13-0.16	Low	1.0-3.0	0.20	0.20	3	3
	10-20	5-15	1.30-1.65	2.00-6.00	0.12-0.15	Low	0.5-1.0	0.20	---		
	20-30	0-10	1.30-1.65	6.00-20.00	0.07-0.08	Low	0.5-1.0	0.10	---		
	30-60	0-5	1.30-1.65	6.00-20.00	0.04-0.05	Low	0.0-0.5	0.05	---		
102:											
Tevis-----------	0-3	10-15	1.20-1.40	2.00-6.00	0.12-0.15	Low	0.5-2.0	0.20	0.37	5	5
	3-14	5-10	1.30-1.50	2.00-6.00	0.06-0.08	Low	0.5-2.0	0.10	---		
	14-22	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	22-60	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
103:											
Tevis-----------	0-3	10-15	1.20-1.40	2.00-6.00	0.12-0.15	Low	0.5-2.0	0.20	0.37	5	5
	3-14	5-10	1.30-1.50	2.00-6.00	0.06-0.08	Low	0.5-2.0	0.10	---		
	14-22	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	22-60	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
Mitten----------	0-9	5-10	0.65-0.95	0.60-2.00	0.14-0.17	Low	2.0-4.0	0.17	0.37	5	5
	9-16	5-10	1.35-1.60	2.00-6.00	0.06-0.08	Low	1.0-2.0	0.10	---		
	16-34	5-10	1.35-1.60	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	34-60	5-10	1.40-1.65	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
104:											
Tevis-----------	0-3	10-15	1.20-1.40	2.00-6.00	0.12-0.15	Low	0.5-2.0	0.20	0.37	5	5
	3-14	5-10	1.30-1.50	2.00-6.00	0.06-0.08	Low	0.5-2.0	0.10	---		
	14-22	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	22-60	5-10	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.05	---		
Mitten----------	0-9	5-10	0.65-0.95	0.60-2.00	0.14-0.17	Low	2.0-4.0	0.17	0.37	5	5
	9-16	5-10	1.35-1.60	2.00-6.00	0.06-0.08	Low	1.0-2.0	0.10	---		
	16-34	5-10	1.35-1.60	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	34-60	5-10	1.40-1.65	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
Rock outcrop.											

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
105:											
Totelake--------	0-7	8-15	0.95-1.25	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.17	0.37	3	5
	7-22	5-10	1.30-1.55	2.00-6.00	0.07-0.08	Low	0.5-1.0	0.10	---		
	22-60	0-10	1.40-1.65	6.00-20.00	0.02-0.03	Low	0.0-0.5	0.05	---		
106:											
Totelake--------	0-7	8-15	0.95-1.25	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.17	0.37	3	5
	7-22	5-10	1.30-1.55	2.00-6.00	0.07-0.08	Low	0.5-1.0	0.10	---		
	22-60	0-10	1.40-1.65	6.00-20.00	0.02-0.03	Low	0.0-0.5	0.05	---		
107:											
Totelake--------	0-4	8-15	1.00-1.35	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.02	0.37	2	8
	4-17	5-10	1.35-1.60	2.00-6.00	0.07-0.08	Low	0.5-1.0	0.10	---		
	17-60	0-10	1.50-1.70	6.00-20.00	0.02-0.03	Low	0.0-0.5	0.05	---		
108:											
Trapps----------	0-10	10-15	1.10-1.30	0.60-2.00	0.13-0.16	Low	2.0-5.0	0.17	0.37	3	5
	10-24	27-35	1.15-1.35	0.20-0.60	0.08-0.09	Moderate	1.0-2.0	0.15	---		
	24-35	10-15	1.30-1.50	0.60-2.00	0.09-0.10	Low	0.5-1.0	0.10	---		
	35-60	10-15	1.30-1.55	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.05	---		
109:											
Trapps----------	0-10	10-15	1.10-1.30	0.60-2.00	0.13-0.16	Low	2.0-5.0	0.17	0.37	3	5
	10-24	27-35	1.15-1.35	0.20-0.60	0.08-0.09	Moderate	1.0-2.0	0.15	---		
	24-35	10-15	1.30-1.50	0.60-2.00	0.09-0.10	Low	0.5-1.0	0.10	---		
	35-60	10-15	1.30-1.55	0.60-2.00	0.04-0.05	Low	0.0-0.5	0.05	---		
110:											
Turrah----------	0-4	27-40	1.10-1.30	0.20-0.60	0.16-0.20	Moderate	3.0-5.0	0.32	0.32	4	4
	4-12	35-60	1.20-1.45	0.06-0.20	0.14-0.17	High	2.0-4.0	0.32	---		
	12-38	35-60	1.25-1.50	0.06-0.20	0.14-0.17	High	0.5-1.0	0.32	---		
	38-60	20-40	1.50-1.75	0.06-0.20	0.07-0.08	Moderate	0.0-0.5	0.15	---		
111:											
Udifluvents.											
112:											
Udorthents.											
Glaciercreek----	0-14	5-15	0.85-1.00	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.17	0.37	2	5
	14-60	0-10	1.50-1.65	>20.00	0.01-0.02	Low	0.0-0.5	0.02	---		
113:											
Upsata----------	0-6	7-15	0.85-0.95	2.00-6.00	0.12-0.15	Low	1.0-4.0	0.10	0.20	2	3
	6-14	3-7	0.85-0.95	2.00-6.00	0.11-0.14	Low	1.0-2.0	0.17	---		
	14-60	0-5	1.60-1.75	>20.00	0.01-0.02	Low	0.0-0.5	0.02	---		
114:											
Urban land.											
115:											
Waldbillig------	0-10	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-26	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	26-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
116:											
Waldbillig------	0-10	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-26	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	26-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors			Wind erodi- bility group
								K	Kf	T	
	In	Pct	g/cc	In/hr	In/in		Pct				
117:											
Waldbillig------	0-10	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-26	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	26-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
Auggie----------	0-6	10-20	1.10-1.30	0.60-2.00	0.18-0.22	Low	2.0-5.0	0.32	0.32	5	5
	6-20	27-35	1.30-1.50	0.20-0.60	0.16-0.20	Moderate	1.0-2.0	0.32	---		
	20-60	27-35	1.30-1.50	0.20-0.60	0.16-0.20	Moderate	0.5-1.0	0.32	---		
118:											
Waldbillig------	0-10	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-26	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	26-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
Holloway--------	0-10	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	10-17	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	17-52	5-15	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	52-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
119:											
Waldbillig------	0-10	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	10-26	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	26-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
Holloway--------	0-10	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	10-17	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	17-52	5-15	1.30-1.50	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	52-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
120:											
Waldbillig------	0-11	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	11-25	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	25-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
Holloway--------	0-11	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	11-21	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	21-45	5-15	1.30-1.55	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	45-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
121:											
Waldbillig------	0-11	5-15	0.65-0.95	0.60-2.00	0.13-0.16	Low	1.0-4.0	0.20	0.37	5	5
	11-25	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	---		
	25-60	7-18	1.40-1.65	0.60-2.00	0.08-0.10	Low	0.0-0.5	0.10	---		
Holloway--------	0-11	5-15	0.80-0.95	0.60-2.00	0.15-0.18	Low	2.0-4.0	0.15	0.37	3	5
	11-21	5-15	1.30-1.55	2.00-6.00	0.04-0.06	Low	1.0-2.0	0.05	---		
	21-45	5-15	1.30-1.55	2.00-6.00	0.03-0.04	Low	0.5-1.0	0.05	---		
	45-60	5-15	1.40-1.70	2.00-6.00	0.02-0.03	Low	0.0-0.5	0.05	---		
122:											
Whitore---------	0-8	27-35	1.30-1.50	0.60-2.00	0.11-0.13	Moderate	0.5-2.0	0.20	0.32	2	6
	8-60	20-35	1.40-1.65	0.60-2.00	0.06-0.07	Moderate	0.0-0.5	0.10	---		
123:											
Whitore---------	0-8	27-35	1.30-1.50	0.60-2.00	0.11-0.13	Moderate	0.5-2.0	0.20	0.32	2	6
	8-60	20-35	1.40-1.65	0.60-2.00	0.06-0.07	Moderate	0.0-0.5	0.10	---		
124:											
Wildgen---------	0-6	15-25	1.10-1.30	0.60-2.00	0.12-0.15	Low	4.0-6.0	0.15	0.37	5	6
	6-19	15-25	1.35-1.55	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.15	---		
	19-60	10-25	1.40-1.60	0.60-2.00	0.07-0.08	Low	0.0-0.5	0.10	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
125:											
Wildgen---------	0-6	15-25	1.10-1.30	0.60-2.00	0.12-0.15	Low	4.0-6.0	0.15	0.37	5	6
	6-19	15-25	1.35-1.55	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.15	---		
	19-60	10-25	1.40-1.60	0.60-2.00	0.07-0.08	Low	0.0-0.5	0.10	---		
Winkler---------	0-4	7-15	1.15-1.35	2.00-6.00	0.11-0.14	Low	2.0-4.0	0.15	0.37	5	5
	4-21	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	21-60	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
126:											
Wildgen---------	0-6	15-25	1.10-1.30	0.60-2.00	0.12-0.15	Low	4.0-6.0	0.15	0.37	5	6
	6-19	15-25	1.35-1.55	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.15	---		
	19-60	10-25	1.40-1.60	0.60-2.00	0.07-0.08	Low	0.0-0.5	0.10	---		
Winkler---------	0-4	7-15	1.15-1.35	2.00-6.00	0.11-0.14	Low	2.0-4.0	0.15	0.37	5	5
	4-21	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	21-60	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
127:											
Wildgen---------	0-3	15-25	1.10-1.30	0.60-2.00	0.12-0.15	Low	4.0-6.0	0.15	0.37	5	6
	3-19	15-25	1.35-1.55	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.15	---		
	19-60	10-25	1.40-1.60	0.60-2.00	0.07-0.08	Low	0.0-0.5	0.10	---		
Winkler---------	0-3	7-15	1.20-1.40	2.00-6.00	0.07-0.09	Low	2.0-4.0	0.02	0.20	5	3
	3-25	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	25-42	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	42-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
128:											
Wildgen---------	0-3	15-25	1.10-1.30	0.60-2.00	0.12-0.15	Low	4.0-6.0	0.15	0.37	5	6
	3-19	15-25	1.35-1.55	0.60-2.00	0.09-0.11	Low	0.5-1.0	0.15	---		
	19-60	10-25	1.40-1.60	0.60-2.00	0.07-0.08	Low	0.0-0.5	0.10	---		
Winkler---------	0-3	7-15	1.20-1.40	2.00-6.00	0.07-0.09	Low	2.0-4.0	0.02	0.20	5	3
	3-25	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	25-42	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	42-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
129:											
Winfall---------	0-18	10-20	1.20-1.40	0.60-2.00	0.12-0.15	Low	0.5-2.0	0.24	0.37	5	5
	18-60	10-20	1.40-1.60	0.60-2.00	0.08-0.09	Low	0.0-0.5	0.15	---		
130:											
Winkler---------	0-8	7-15	1.20-1.40	2.00-6.00	0.07-0.09	Low	2.0-4.0	0.02	0.20	5	3
	8-25	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	25-42	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	42-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
131:											
Winkler---------	0-8	7-15	1.20-1.40	2.00-6.00	0.07-0.09	Low	2.0-4.0	0.02	0.20	5	3
	8-25	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	25-42	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	42-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
132:											
Winkler---------	0-4	7-15	1.15-1.35	2.00-6.00	0.11-0.14	Low	2.0-4.0	0.15	0.37	5	5
	4-21	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	21-40	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	40-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		

PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Pct				
133:											
Winkler---------	0-4	7-15	1.15-1.35	2.00-6.00	0.11-0.14	Low	2.0-4.0	0.15	0.37	5	5
	4-21	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	21-40	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	40-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
134:											
Winkler---------	0-8	7-15	1.20-1.40	2.00-6.00	0.07-0.09	Low	2.0-4.0	0.02	0.20	5	3
	8-30	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	30-47	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	47-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
Rubble land.											
135:											
Winkler---------	0-4	7-15	1.15-1.35	2.00-6.00	0.11-0.14	Low	2.0-4.0	0.15	0.37	5	5
	4-21	5-15	1.40-1.60	2.00-6.00	0.05-0.06	Low	0.5-1.0	0.05	---		
	21-40	5-15	1.40-1.60	2.00-6.00	0.04-0.05	Low	0.0-0.5	0.05	---		
	40-60	5-15	1.40-1.65	2.00-6.00	0.03-0.04	Low	0.0-0.5	0.02	---		
Rock outcrop.											
136:											
Xerofluvents.											
137:											
Yourame---------	0-4	7-15	1.30-1.50	0.60-2.00	0.13-0.16	Low	0.5-2.0	0.24	0.37	5	5
	4-21	7-15	1.35-1.55	0.60-2.00	0.11-0.13	Low	0.5-1.0	0.10	---		
	21-48	20-35	1.45-1.70	0.20-0.60	0.07-0.08	Moderate	0.5-1.0	0.10	---		
	48-60	18-30	1.45-1.70	0.20-0.60	0.08-0.09	Moderate	0.0-0.5	0.10	---		

CHEMICAL PROPERTIES OF THE SOILS

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
1:						
Alberton--------	0-9	5-18	5.0-10.0	6.6-7.3	---	---
	9-16	5-18	5.0-10.0	6.6-7.3	---	---
	16-30	5-18	5.0-10.0	6.6-7.3	---	---
	30-60	5-10	1.0-5.0	6.6-7.3	---	---
2:						
Ambrant---------	0-4	5-15	15.0-25.0	5.6-7.3	---	---
	4-20	5-15	5.0-15.0	5.6-7.3	---	---
	20-39	5-18	5.0-10.0	5.6-7.3	---	---
	39-60	0-5	1.0-5.0	5.6-7.3	---	---
3:						
Ambrant---------	0-4	5-15	15.0-25.0	5.6-7.3	---	---
	4-20	5-15	5.0-15.0	5.6-7.3	---	---
	20-39	5-18	5.0-10.0	5.6-7.3	---	---
	39-60	0-5	1.0-5.0	5.6-7.3	---	---
Rochester-------	0-7	0-10	5.0-10.0	6.6-7.3	---	---
	7-12	0-10	1.0-5.0	6.6-7.3	---	---
	12-60	0-10	1.0-5.0	6.6-7.8	---	---
Rock outcrop.						
4:						
Aquic Haploxerolls.						
5:						
Aquic Udorthents.						
6:						
Aquolls.						
Aquepts.						
7:						
Argixerolls.						
Haploxerolls.						
8:						
Argixerolls.						
Haploxerolls.						
9:						
Argixerolls.						
Haploxerolls.						
10:						
Argixerolls.						
Haploxerolls.						
11:						
Auggie----------	0-6	10-20	15.0-20.0	5.6-7.3	---	---
	6-20	27-35	20.0-25.0	6.1-7.3	---	---
	20-45	27-35	15.0-20.0	6.1-7.8	---	---
	45-60	10-20	5.0-10.0	6.1-7.8	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
12:						
Bata	0-10	10-20	25.0-30.0	5.1-6.5	---	---
	10-22	12-25	10.0-15.0	5.6-6.5	---	---
	22-60	20-35	10.0-15.0	5.6-6.5	---	---
13:						
Bata	0-9	10-20	25.0-30.0	5.1-6.5	---	---
	9-20	12-25	10.0-15.0	5.6-6.5	---	---
	20-60	20-35	10.0-15.0	5.6-6.5	---	---
Waldbillig	0-10	5-15	25.0-30.0	5.6-6.5	---	---
	10-26	7-18	15.0-20.0	5.6-6.5	---	---
	26-60	7-18	10.0-15.0	6.1-7.3	---	---
14:						
Beeskove	0-8	7-15	10.0-15.0	6.6-7.3	---	---
	8-20	5-15	5.0-10.0	6.6-7.3	---	---
	20-27	5-15	5.0-10.0	6.6-7.3	---	---
	27-60	5-15	5.0-10.0	7.9-8.4	10-15	0-2
15:						
Beeskove	0-8	7-15	10.0-15.0	6.6-7.3	---	---
	8-20	5-15	5.0-10.0	6.6-7.3	---	---
	20-27	5-15	5.0-10.0	6.6-7.3	---	---
	27-60	5-15	5.0-10.0	7.9-8.4	10-15	0-2
Rock outcrop.						
16:						
Bigarm	0-11	7-18	10.0-15.0	6.6-7.3	---	---
	11-15	5-18	5.0-10.0	6.6-7.3	---	---
	15-40	5-18	5.0-10.0	6.6-7.3	---	---
	40-60	5-18	2.0-5.0	6.6-7.3	---	---
17:						
Bigarm	0-11	7-18	10.0-15.0	6.6-7.3	---	---
	11-15	5-18	5.0-10.0	6.6-7.3	---	---
	15-40	5-18	5.0-10.0	6.6-7.3	---	---
	40-60	5-18	2.0-5.0	6.6-7.3	---	---
18:						
Bigarm	0-11	7-18	10.0-15.0	6.6-7.3	---	---
	11-15	5-18	5.0-10.0	6.6-7.3	---	---
	15-40	5-18	5.0-10.0	6.6-7.3	---	---
	40-60	5-18	2.0-5.0	6.6-7.3	---	---
19:						
Bigarm	0-11	7-18	10.0-15.0	6.6-7.3	---	---
	11-15	5-18	5.0-10.0	6.6-7.3	---	---
	15-40	5-18	5.0-10.0	6.6-7.3	---	---
	40-60	5-18	2.0-5.0	6.6-7.3	---	---
20:						
Bigarm	0-11	7-18	10.0-15.0	6.6-7.3	---	---
	11-15	5-18	5.0-10.0	6.6-7.3	---	---
	15-40	5-18	5.0-10.0	6.6-7.3	---	---
	40-60	5-18	2.0-5.0	6.6-7.3	---	---
Rock outcrop.						

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
21:						
Biglake---------	0-9	5-15	5.0-10.0	6.6-7.3	---	---
	9-16	5-10	1.0-5.0	6.6-7.3	---	---
	16-60	0-10	1.0-5.0	6.6-7.3	---	---
22:						
Biglake---------	0-9	5-15	5.0-10.0	6.6-7.3	---	---
	9-16	5-10	1.0-5.0	6.6-7.3	---	---
	16-60	0-10	1.0-5.0	6.6-7.3	---	---
23:						
Bignell---------	0-11	10-20	10.0-15.0	5.1-6.0	---	---
	11-15	10-25	10.0-15.0	5.1-6.0	---	---
	15-60	35-60	25.0-30.0	5.1-6.5	---	---
24:						
Bignell---------	0-12	10-20	10.0-15.0	5.1-6.0	---	---
	12-22	10-25	10.0-15.0	5.1-6.0	---	---
	22-60	35-60	25.0-30.0	5.1-6.5	---	---
Winkler---------	0-4	7-15	10.0-15.0	6.1-7.3	---	---
	4-21	5-15	5.0-10.0	5.6-7.3	---	---
	21-40	5-15	5.0-10.0	5.6-6.5	---	---
	40-60	5-15	5.0-10.0	5.6-6.5	---	---
25:						
Bignell---------	0-11	10-20	10.0-15.0	5.1-6.0	---	---
	11-15	10-25	10.0-15.0	5.1-6.0	---	---
	15-60	35-60	25.0-30.0	5.1-6.5	---	---
Winkler---------	0-8	7-15	10.0-15.0	6.1-7.3	---	---
	8-25	5-15	5.0-10.0	5.6-7.3	---	---
	25-42	5-15	5.0-10.0	5.6-6.5	---	---
	42-60	5-15	5.0-10.0	5.6-6.5	---	---
26:						
Borohemists.						
27:						
Chickaman-------	0-9	5-8	20.0-30.0	6.1-6.5	---	---
	9-30	5-10	5.0-10.0	6.1-6.5	---	---
	30-60	5-10	1.0-5.0	6.1-6.5	---	---
28:						
Chickaman-------	0-9	5-8	20.0-30.0	6.1-6.5	---	---
	9-30	5-10	5.0-10.0	6.1-6.5	---	---
	30-60	5-10	1.0-5.0	6.1-6.5	---	---
29:						
Coerock---------	0-15	7-15	20.0-30.0	5.6-6.5	---	---
	15-18	7-15	20.0-30.0	5.6-6.0	---	---
	18-60	---	---	---	---	---
Rock outcrop.						
30:						
Coerock---------	0-15	7-15	20.0-30.0	5.6-6.5	---	---
	15-18	7-15	20.0-30.0	5.6-6.0	---	---
	18-60	---	---	---	---	---
Rock outcrop.						

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
31:						
Courville	0-10	7-15	25.0-30.0	5.6-6.5	---	---
	10-27	5-18	5.0-10.0	6.1-7.3	---	---
	27-60	10-25	5.0-10.0	6.1-7.3	---	---
32:						
Courville	0-10	7-15	25.0-30.0	5.6-6.5	---	---
	10-27	5-18	5.0-10.0	6.1-7.3	---	---
	27-60	10-25	5.0-10.0	6.1-7.3	---	---
Mitten	0-9	5-10	20.0-25.0	5.6-6.5	---	---
	9-16	5-10	5.0-10.0	5.6-6.5	---	---
	16-34	5-10	5.0-10.0	5.6-6.5	---	---
	34-60	5-10	1.0-5.0	5.6-7.3	---	---
33:						
Crow	0-4	10-20	10.0-15.0	5.6-6.5	---	---
	4-10	20-40	10.0-20.0	5.6-6.5	---	---
	10-48	40-60	15.0-20.0	6.1-7.3	---	---
	48-60	20-35	10.0-15.0	6.1-7.8	---	---
34:						
Desmet	0-7	10-18	10.0-15.0	6.6-7.8	---	---
	7-15	10-18	10.0-15.0	7.4-8.4	---	---
	15-24	10-18	5.0-10.0	7.4-8.4	8-15	---
	24-39	10-18	5.0-10.0	7.4-8.4	5-12	0-2
	39-60	10-18	5.0-10.0	7.4-8.4	5-12	0-2
35:						
Elkner	0-7	5-10	10.0-15.0	5.6-6.5	---	---
	7-20	5-10	5.0-10.0	5.6-6.5	---	---
	20-36	5-10	5.0-10.0	5.6-6.5	---	---
	36-60	0-5	1.0-5.0	5.6-6.5	---	---
Ovando	0-6	5-10	5.0-10.0	5.6-6.5	---	---
	6-25	0-5	1.0-5.0	5.6-6.5	---	---
	25-49	0-5	1.0-5.0	5.6-6.5	---	---
	49-60	0-5	1.0-5.0	5.6-6.5	---	---
36:						
Evaro	0-4	7-15	10.0-15.0	6.1-6.5	---	---
	4-16	5-15	5.0-10.0	5.6-7.3	---	---
	16-60	5-18	5.0-10.0	5.6-7.3	---	---
37:						
Evaro	0-4	7-15	10.0-15.0	6.1-6.5	---	---
	4-16	5-15	5.0-10.0	5.6-7.3	---	---
	16-60	5-18	5.0-10.0	5.6-7.3	---	---
38:						
Felan	0-8	10-20	25.0-30.0	5.1-6.0	---	---
	8-33	10-20	15.0-20.0	5.1-7.3	---	---
	33-60	10-20	15.0-20.0	6.6-8.4	---	0-2
39:						
Felan	0-8	10-20	25.0-30.0	5.1-6.0	---	---
	8-33	10-20	15.0-20.0	5.1-7.3	---	---
	33-60	10-20	15.0-20.0	6.6-8.4	---	0-2

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
40:						
Felan	0-12	10-20	25.0-30.0	5.1-6.0	---	---
	12-40	10-20	15.0-20.0	5.1-7.3	---	---
	40-60	10-20	15.0-20.0	6.6-8.4	---	0-2
41:						
Felan	0-12	10-20	25.0-30.0	5.1-6.0	---	---
	12-40	10-20	15.0-20.0	5.1-7.3	---	---
	40-60	10-20	15.0-20.0	6.6-8.4	---	0-2
42:						
Glaciercreek	0-14	5-15	20.0-25.0	5.6-7.3	---	---
	14-60	0-10	1.0-5.0	5.6-7.3	---	---
43:						
Glaciercreek variant	0-9	5-15	20.0-25.0	5.6-7.3	---	---
	9-32	5-15	15.0-20.0	5.6-7.3	---	---
	32-60	5-15	5.0-10.0	5.6-7.3	---	---
Glaciercreek	0-14	5-15	20.0-25.0	5.6-7.3	---	---
	14-60	0-10	1.0-5.0	5.6-7.3	---	---
44:						
Grantsdale	0-9	10-18	15.0-20.0	6.1-7.3	---	---
	9-17	10-18	10.0-15.0	6.1-7.3	---	---
	17-32	10-18	5.0-10.0	7.4-8.4	5-15	---
	32-60	5-10	1.0-5.0	7.4-8.4	5-15	0-2
45:						
Grassvalley	0-9	30-40	15.0-20.0	6.6-7.8	---	---
	9-21	40-60	15.0-20.0	6.6-8.4	---	---
	21-28	40-60	15.0-20.0	7.4-8.4	5-15	---
	28-60	35-60	15.0-20.0	7.4-8.4	5-10	0-2
46:						
Grassvalley	0-9	30-40	15.0-20.0	6.6-7.8	---	---
	9-23	40-60	15.0-20.0	6.6-8.4	---	---
	23-39	40-60	15.0-20.0	7.4-8.4	5-15	---
	39-60	35-60	15.0-20.0	7.4-8.4	5-10	0-2
47:						
Grassvalley	0-7	30-40	15.0-20.0	6.6-7.8	---	---
	7-24	40-60	15.0-20.0	7.4-8.4	---	---
	24-52	40-60	15.0-20.0	6.6-8.4	0-15	---
	52-60	35-60	15.0-20.0	7.4-8.4	5-10	0-2
48:						
Grassvalley	0-7	30-40	15.0-20.0	6.6-7.8	---	---
	7-24	40-60	15.0-20.0	7.4-8.4	---	---
	24-52	40-60	15.0-20.0	7.4-8.4	5-15	---
	52-60	35-60	15.0-20.0	7.4-8.4	5-10	0-2
49:						
Greenough	0-8	5-20	10.0-15.0	5.6-6.5	---	---
	8-22	5-20	5.0-10.0	6.1-7.3	---	---
	22-49	18-32	10.0-15.0	6.1-7.3	---	---
	49-60	18-32	10.0-15.0	6.1-7.3	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
50:						
Hagstadt--------	0-5	20-27	15.0-20.0	6.1-7.3	---	---
	5-21	27-35	15.0-20.0	6.1-7.3	---	---
	21-60	---	---	---	---	---
51:						
Half Moon-------	0-7	15-25	15.0-20.0	4.5-7.3	---	---
	7-18	25-35	15.0-20.0	6.1-7.8	---	---
	18-60	20-30	10.0-15.0	7.4-9.0	5-15	0-4
52:						
Hanaker---------	0-15	10-20	15.0-20.0	6.6-7.8	---	---
	15-25	27-35	20.0-25.0	7.9-8.4	---	0-2
	25-32	18-27	15.0-20.0	7.9-8.4	5-15	0-4
	32-42	10-20	10.0-15.0	7.9-8.4	5-15	0-4
	42-60	15-27	10.0-15.0	7.9-8.4	5-15	0-4
53:						
Hollandlake-----	0-4	10-18	10.0-15.0	5.1-6.0	---	---
	4-12	15-27	10.0-15.0	5.1-6.0	---	---
	12-22	20-30	10.0-15.0	5.1-6.0	---	---
	22-60	25-35	10.0-15.0	6.6-7.3	---	---
54:						
Hollandlake-----	0-4	10-18	10.0-15.0	5.1-6.0	---	---
	4-12	15-27	10.0-15.0	5.1-6.0	---	---
	12-22	20-30	10.0-15.0	5.1-6.0	---	---
	22-60	25-35	10.0-15.0	6.6-7.3	---	---
Bata------------	0-9	10-20	25.0-30.0	5.1-6.5	---	---
	9-20	12-25	10.0-15.0	5.6-6.5	---	---
	20-60	20-35	10.0-15.0	5.6-6.5	---	---
55:						
Hollandlake-----	0-4	10-18	10.0-15.0	5.1-6.0	---	---
	4-12	15-27	10.0-15.0	5.1-6.0	---	---
	12-22	20-30	10.0-15.0	5.1-6.0	---	---
	22-60	25-35	10.0-15.0	6.6-7.3	---	---
Bata------------	0-9	10-20	25.0-30.0	5.1-6.5	---	---
	9-20	12-25	10.0-15.0	5.6-6.5	---	---
	20-60	20-35	10.0-15.0	5.6-6.5	---	---
56:						
Holloway--------	0-10	5-15	25.0-30.0	5.1-6.5	---	---
	10-17	5-15	10.0-15.0	5.1-6.5	---	---
	17-52	5-15	5.0-10.0	5.1-6.5	---	---
	52-60	5-15	5.0-10.0	5.1-6.5	---	---
57:						
Holloway--------	0-10	5-15	25.0-30.0	5.1-6.5	---	---
	10-17	5-15	10.0-15.0	5.1-6.5	---	---
	17-52	5-15	5.0-10.0	5.1-6.5	---	---
	52-60	5-15	5.0-10.0	5.1-6.5	---	---
58:						
Holloway--------	0-11	5-15	25.0-30.0	5.1-6.5	---	---
	11-21	5-15	10.0-15.0	5.1-6.5	---	---
	21-45	5-15	5.0-10.0	5.1-6.5	---	---
	45-60	5-15	5.0-10.0	5.1-6.5	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
59:						
Holloway----------	0-11	5-15	25.0-30.0	5.1-6.5	---	---
	11-21	5-15	10.0-15.0	5.1-6.5	---	---
	21-45	5-15	5.0-10.0	5.1-6.5	---	---
	45-60	5-15	5.0-10.0	5.1-6.5	---	---
60:						
Holloway----------	0-10	5-15	25.0-30.0	5.1-6.5	---	---
	10-17	5-15	10.0-15.0	5.1-6.5	---	---
	17-52	5-15	5.0-10.0	5.1-6.5	---	---
	52-60	5-15	5.0-10.0	5.1-6.5	---	---
Rock outcrop.						
61:						
Jimlake-----------	0-7	7-15	20.0-30.0	5.6-6.5	---	---
	7-14	10-18	10.0-15.0	6.1-7.3	---	---
	14-38	13-20	10.0-15.0	6.1-7.3	---	---
	38-60	10-18	5.0-10.0	6.6-7.8	---	---
62:						
Jimlake-----------	0-7	7-15	20.0-30.0	5.6-6.5	---	---
	7-14	10-18	10.0-15.0	6.1-7.3	---	---
	14-38	13-20	10.0-15.0	6.1-7.3	---	---
	38-60	10-18	5.0-10.0	6.6-7.8	---	---
63:						
Lantern-----------	0-14	5-15	5.0-10.0	6.1-6.5	---	---
	14-26	5-15	5.0-10.0	6.1-6.5	---	---
	26-39	5-18	5.0-10.0	6.1-7.3	---	---
	39-60	5-15	1.0-5.0	6.1-7.3	---	---
64:						
Lantern-----------	0-14	5-15	5.0-10.0	6.1-6.5	---	---
	14-26	5-15	5.0-10.0	6.1-6.5	---	---
	26-39	5-18	5.0-10.0	6.1-7.3	---	---
	39-60	5-15	1.0-5.0	6.1-7.3	---	---
65:						
Lantern-----------	0-14	5-15	5.0-10.0	6.1-6.5	---	---
	14-26	5-15	5.0-10.0	6.1-6.5	---	---
	26-39	5-18	5.0-10.0	6.1-7.3	---	---
	39-60	5-15	1.0-5.0	6.1-7.3	---	---
Rock outcrop.						
66:						
Lolopeak----------	0-9	7-12	30.0-35.0	5.1-6.0	---	---
	9-27	0-5	0.0-2.0	5.1-6.0	---	---
	27-60	0-5	0.0-2.0	5.1-6.0	---	---
67:						
Lolopeak----------	0-9	7-12	30.0-35.0	5.1-6.0	---	---
	9-27	0-5	0.0-2.0	5.1-6.0	---	---
	27-60	0-5	0.0-2.0	5.1-6.0	---	---
Rock outcrop.						

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
68:						
Lubrecht	0-8	10-20	15.0-20.0	5.1-6.5	---	---
	8-11	27-40	15.0-20.0	5.6-6.5	---	---
	11-30	40-60	20.0-25.0	5.1-6.5	---	---
	30-36	27-40	10.0-15.0	5.1-6.5	---	---
	36-60	---	---	---	---	---
69:						
Mitten	0-9	5-10	20.0-25.0	5.6-6.5	---	---
	9-16	5-10	5.0-10.0	5.6-6.5	---	---
	16-34	5-10	5.0-10.0	5.6-6.5	---	---
	34-60	5-10	1.0-5.0	5.6-7.3	---	---
70:						
Mitten	0-9	5-10	20.0-25.0	5.6-6.5	---	---
	9-16	5-10	5.0-10.0	5.6-6.5	---	---
	16-34	5-10	5.0-10.0	5.6-6.5	---	---
	34-60	5-10	1.0-5.0	5.6-7.3	---	---
Sharrott	0-7	10-15	10.0-15.0	5.6-6.5	---	---
	7-14	10-15	5.0-10.0	5.6-6.5	---	---
	14-16	10-15	5.0-10.0	5.6-6.5	---	---
	16-60	---	---	---	---	---
71:						
Mitten	0-9	5-10	20.0-25.0	5.6-6.5	---	---
	9-16	5-10	5.0-10.0	5.6-6.5	---	---
	16-34	5-10	5.0-10.0	5.6-6.5	---	---
	34-60	5-10	1.0-5.0	5.6-7.3	---	---
Tevis	0-3	10-15	5.0-10.0	5.6-7.3	---	---
	3-14	5-10	2.0-5.0	5.6-7.3	---	---
	14-22	5-10	1.0-5.0	5.6-7.3	---	---
	22-60	5-10	1.0-5.0	6.1-7.3	---	---
72:						
Moiese	0-9	10-22	15.0-20.0	6.1-7.3	---	---
	9-21	5-15	5.0-10.0	6.6-7.8	0-1	---
	21-60	0-5	1.0-5.0	6.6-8.4	5-15	0-2
73:						
Orthents.						
74:						
Ovando	0-6	5-10	5.0-10.0	5.6-6.5	---	---
	6-25	0-5	1.0-5.0	5.6-6.5	---	---
	25-49	0-5	1.0-5.0	5.6-6.5	---	---
	49-60	0-5	1.0-5.0	5.6-6.5	---	---
Elkner	0-7	5-10	10.0-15.0	5.6-6.5	---	---
	7-20	5-10	5.0-10.0	5.6-6.5	---	---
	20-36	5-10	5.0-10.0	5.6-6.5	---	---
	36-60	0-5	1.0-5.0	5.6-6.5	---	---
Rock outcrop.						
75:						
Perma	0-12	7-20	10.0-20.0	6.6-7.3	---	---
	12-36	7-20	10.0-15.0	6.6-7.8	---	---
	36-60	0-15	1.0-5.0	6.6-7.8	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
76:						
Perma-----------	0-10	7-20	10.0-20.0	6.6-7.3	---	---
	10-38	7-20	10.0-15.0	6.6-7.8	---	---
	38-60	0-15	1.0-5.0	6.6-7.8	---	---
77:						
Perma-----------	0-7	7-20	10.0-20.0	6.6-7.3	---	---
	7-38	7-20	10.0-15.0	6.6-7.8	---	---
	38-60	0-15	1.0-5.0	6.6-7.8	---	---
78:						
Perma variant---	0-12	15-25	15.0-20.0	6.1-7.3	---	---
	12-33	27-35	20.0-25.0	6.6-7.8	---	---
	33-60	15-30	15.0-20.0	7.9-8.4	5-15	0-2
79:						
Perma variant---	0-12	15-25	15.0-20.0	6.1-7.3	---	---
	12-33	27-35	20.0-25.0	6.6-7.8	---	---
	33-60	15-30	15.0-20.0	7.9-8.4	---	0-2
Perma-----------	0-7	7-20	10.0-20.0	6.6-7.3	---	---
	7-38	7-20	10.0-15.0	6.6-7.8	---	---
	38-60	0-15	1.0-5.0	6.6-7.8	---	---
80:						
Petty-----------	0-12	7-15	20.0-30.0	5.6-6.5	---	---
	12-24	5-15	5.0-10.0	5.6-6.5	---	---
	24-36	5-15	5.0-10.0	5.6-6.5	---	---
	36-60	5-15	1.0-5.0	5.6-6.5	---	---
81:						
Petty-----------	0-12	7-15	20.0-30.0	5.6-6.5	---	---
	12-24	5-15	5.0-10.0	5.6-6.5	---	---
	24-36	5-15	5.0-10.0	5.6-6.5	---	---
	36-60	5-15	1.0-5.0	5.6-6.5	---	---
82:						
Petty-----------	0-8	7-15	20.0-30.0	5.6-6.5	---	---
	8-18	5-15	5.0-10.0	5.6-6.5	---	---
	18-32	5-15	5.0-10.0	5.6-6.5	---	---
	32-60	5-15	1.0-5.0	5.6-6.5	---	---
83:						
Petty-----------	0-9	7-15	20.0-30.0	5.6-6.5	---	---
	9-31	5-15	5.0-10.0	5.6-6.5	---	---
	31-60	5-15	1.0-5.0	5.6-6.5	---	---
84:						
Petty-----------	0-9	7-15	20.0-30.0	5.6-6.5	---	---
	9-30	5-15	5.0-10.0	5.6-6.5	---	---
	30-60	5-15	1.0-5.0	5.6-6.5	---	---
85:						
Petty-----------	0-9	7-15	20.0-30.0	5.6-6.5	---	---
	9-30	5-15	5.0-10.0	5.6-6.5	---	---
	30-60	5-15	1.0-5.0	5.6-6.5	---	---
Rock outcrop.						

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
86:						
Phillcher	0-10	5-10	25.0-30.0	5.6-6.0	---	---
	10-24	0-10	2.0-5.0	5.6-6.0	---	---
	24-60	0-10	1.0-5.0	5.6-6.0	---	---
87:						
Phillcher	0-10	5-10	25.0-30.0	5.6-6.0	---	---
	10-24	0-10	2.0-5.0	5.6-6.0	---	---
	24-60	0-10	1.0-5.0	5.6-6.0	---	---
Rock outcrop.						
88:						
Pits.						
89:						
Repp	0-12	10-20	10.0-15.0	6.1-7.8	1-5	---
	12-24	10-20	5.0-10.0	7.4-8.4	5-10	0-2
	24-60	10-18	5.0-10.0	7.4-8.4	10-15	0-2
90:						
Repp	0-9	10-20	10.0-15.0	6.1-7.8	1-5	---
	9-24	10-20	5.0-10.0	7.4-8.4	5-10	0-2
	24-60	10-18	5.0-10.0	7.4-8.4	10-15	0-2
91:						
Repp	0-9	10-20	10.0-15.0	6.1-7.8	1-5	---
	9-24	10-20	5.0-10.0	7.4-8.4	5-10	0-2
	24-60	10-18	5.0-10.0	7.4-8.4	10-15	0-2
92:						
Repp	0-12	10-20	10.0-15.0	6.1-7.8	1-5	---
	12-24	10-20	5.0-10.0	7.4-8.4	5-10	0-2
	24-60	10-18	5.0-10.0	7.4-8.4	10-15	0-2
Rock outcrop.						
93:						
Riverwash.						
94:						
Rock outcrop.						
Rubble land.						
95:						
Rumblecreek	0-8	10-20	10.0-15.0	5.1-6.0	---	---
	8-20	10-20	10.0-15.0	5.1-6.0	---	---
	20-32	20-35	10.0-15.0	5.6-6.5	---	---
	32-60	20-35	10.0-15.0	5.6-6.5	---	---
96:						
Selway	0-18	5-15	5.0-10.0	6.1-7.3	---	---
	18-51	5-15	5.0-10.0	5.6-6.5	---	---
	51-60	5-10	1.0-5.0	5.6-6.5	---	---
97:						
Selway	0-18	5-15	5.0-10.0	6.1-7.3	---	---
	18-51	5-15	5.0-10.0	5.6-6.5	---	---
	51-60	5-10	1.0-5.0	5.6-6.5	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
98:						
Selway----------	0-5	5-15	5.0-10.0	6.1-7.3	---	---
	5-34	5-15	5.0-10.0	5.6-6.5	---	---
	34-60	5-10	1.0-5.0	5.6-6.5	---	---
99:						
Sharrott--------	0-4	10-15	10.0-15.0	5.6-6.5	---	---
	4-13	10-15	5.0-10.0	5.6-6.5	---	---
	13-15	10-15	5.0-10.0	5.6-6.5	---	---
	15-60	---	---	---	---	---
Rock outcrop.						
100:						
Shooflin--------	0-12	10-20	15.0-20.0	5.1-6.0	---	---
	12-51	60-80	50.0-70.0	4.5-6.0	---	---
	51-60	---	---	---	---	---
101:						
Tally variant---	0-10	5-15	10.0-15.0	6.1-7.3	---	---
	10-20	5-15	10.0-15.0	6.1-7.3	---	---
	20-30	0-10	5.0-10.0	6.6-7.3	---	---
	30-60	0-5	1.0-5.0	6.6-7.3	---	---
102:						
Tevis-----------	0-3	10-15	5.0-10.0	5.6-7.3	---	---
	3-14	5-10	2.0-5.0	5.6-7.3	---	---
	14-22	5-10	1.0-5.0	5.6-7.3	---	---
	22-60	5-10	1.0-5.0	6.1-7.3	---	---
103:						
Tevis-----------	0-3	10-15	5.0-10.0	5.6-7.3	---	---
	3-14	5-10	2.0-5.0	5.6-7.3	---	---
	14-22	5-10	1.0-5.0	5.6-7.3	---	---
	22-60	5-10	1.0-5.0	6.1-7.3	---	---
Mitten----------	0-9	5-10	20.0-25.0	5.6-6.5	---	---
	9-16	5-10	5.0-10.0	5.6-6.5	---	---
	16-34	5-10	5.0-10.0	5.6-6.5	---	---
	34-60	5-10	1.0-5.0	5.6-7.3	---	---
104:						
Tevis-----------	0-3	10-15	5.0-10.0	5.6-7.3	---	---
	3-14	5-10	2.0-5.0	5.6-7.3	---	---
	14-22	5-10	1.0-5.0	5.6-7.3	---	---
	22-60	5-10	1.0-5.0	6.1-7.3	---	---
Mitten----------	0-9	5-10	20.0-25.0	5.6-6.5	---	---
	9-16	5-10	5.0-10.0	5.6-6.5	---	---
	16-34	5-10	5.0-10.0	5.6-6.5	---	---
	34-60	5-10	1.0-5.0	5.6-7.3	---	---
Rock outcrop.						
105:						
Totelake--------	0-7	8-15	10.0-15.0	6.6-7.3	---	---
	7-22	5-10	5.0-10.0	6.6-7.3	---	---
	22-60	0-10	1.0-5.0	6.6-7.3	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
106:						
Totelake--------	0-7	8-15	10.0-15.0	6.6-7.3	---	---
	7-22	5-10	5.0-10.0	6.6-7.3	---	---
	22-60	0-10	1.0-5.0	6.6-7.3	---	---
107:						
Totelake--------	0-4	8-15	15.0	6.6-7.3	---	---
	4-17	5-10	5.0-10.0	6.6-7.3	---	---
	17-60	0-10	1.0-5.0	6.6-7.3	---	---
108:						
Trapps----------	0-10	10-15	10.0-15.0	5.6-7.3	---	---
	10-24	27-35	15.0-20.0	6.6-8.4	---	0-2
	24-35	10-15	5.0-10.0	7.9-8.4	15-40	0-2
	35-60	10-15	2.0-5.0	7.9-8.4	10-35	0-2
109:						
Trapps----------	0-10	10-15	10.0-15.0	5.6-7.3	---	---
	10-24	27-35	15.0-20.0	6.6-8.4	---	0-2
	24-35	10-15	5.0-10.0	7.9-8.4	15-40	0-2
	35-60	10-15	2.0-5.0	7.9-8.4	10-35	0-2
110:						
Turrah----------	0-4	27-40	20.0-25.0	5.6-7.3	---	---
	4-12	35-60	25.0-30.0	5.6-7.3	---	---
	12-38	35-60	20.0-25.0	6.6-7.8	---	---
	38-60	20-40	15.0-20.0	6.6-7.8	---	---
111:						
Udifluvents.						
112:						
Udorthents.						
Glaciercreek----	0-14	5-15	20.0-25.0	5.6-7.3	---	---
	14-60	0-10	1.0-5.0	5.6-7.3	---	---
113:						
Upsata----------	0-6	7-15	20.0-30.0	5.1-6.5	---	---
	6-14	3-7	15.0-20.0	5.6-6.5	---	---
	14-60	0-5	1.0-5.0	5.1-6.5	---	---
114:						
Urban land.						
115:						
Waldbillig------	0-10	5-15	25.0-30.0	5.6-6.5	---	---
	10-26	7-18	15.0-20.0	5.6-6.5	---	---
	26-60	7-18	10.0-15.0	6.1-7.3	---	---
116:						
Waldbillig------	0-10	5-15	25.0-30.0	5.6-6.5	---	---
	10-26	7-18	15.0-20.0	5.6-6.5	---	---
	26-60	7-18	10.0-15.0	6.1-7.3	---	---
117:						
Waldbillig------	0-10	5-15	25.0-30.0	5.6-6.5	---	---
	10-26	7-18	15.0-20.0	5.6-6.5	---	---
	26-60	7-18	10.0-15.0	6.1-7.3	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
117:						
Auggie----------	0-6	10-20	15.0-20.0	5.6-7.3	---	---
	6-20	27-35	20.0-25.0	6.1-7.3	---	---
	20-60	27-35	15.0-20.0	6.1-7.8	---	---
118:						
Waldbillig------	0-10	5-15	25.0-30.0	5.6-6.5	---	---
	10-26	7-18	15.0-20.0	5.6-6.5	---	---
	26-60	7-18	10.0-15.0	6.1-7.3	---	---
Holloway--------	0-10	5-15	25.0-30.0	5.1-6.5	---	---
	10-17	5-15	10.0-15.0	5.1-6.5	---	---
	17-52	5-15	5.0-10.0	5.1-6.5	---	---
	52-60	5-15	5.0-10.0	5.1-6.5	---	---
119:						
Waldbillig------	0-10	5-15	25.0-30.0	5.6-6.5	---	---
	10-26	7-18	15.0-20.0	5.6-6.5	---	---
	26-60	7-18	10.0-15.0	6.1-7.3	---	---
Holloway--------	0-10	5-15	25.0-30.0	5.1-6.5	---	---
	10-17	5-15	10.0-15.0	5.1-6.5	---	---
	17-52	5-15	5.0-10.0	5.1-6.5	---	---
	52-60	5-15	5.0-10.0	5.1-6.5	---	---
120:						
Waldbillig------	0-11	5-15	25.0-30.0	5.6-6.5	---	---
	11-25	7-18	15.0-20.0	5.6-6.5	---	---
	25-60	7-18	10.0-15.0	6.1-7.3	---	---
Holloway--------	0-11	5-15	25.0-30.0	5.1-6.5	---	---
	11-21	5-15	10.0-15.0	5.1-6.5	---	---
	21-45	5-15	5.0-10.0	5.1-6.5	---	---
	45-60	5-15	5.0-10.0	5.1-6.5	---	---
121:						
Waldbillig------	0-11	5-15	25.0-30.0	5.6-6.5	---	---
	11-25	7-18	15.0-20.0	5.6-6.5	---	---
	25-60	7-18	10.0-15.0	6.1-7.3	---	---
Holloway--------	0-11	5-15	25.0-30.0	5.1-6.5	---	---
	11-21	5-15	10.0-15.0	5.1-6.5	---	---
	21-45	5-15	5.0-10.0	5.1-6.5	---	---
	45-60	5-15	5.0-10.0	5.1-6.5	---	---
122:						
Whitore---------	0-8	27-35	15.0-20.0	6.6-7.8	0-5	---
	8-60	20-35	10.0-15.0	7.4-9.0	40-50	0-2
123:						
Whitore---------	0-8	27-35	15.0-20.0	6.6-7.8	0-5	---
	8-60	20-35	10.0-15.0	7.4-9.0	40-50	0-2
124:						
Wildgen---------	0-6	15-25	15.0-20.0	6.1-7.3	---	---
	6-19	15-25	10.0-15.0	6.1-7.3	---	---
	19-60	10-25	5.0-10.0	6.1-7.3	---	---
125:						
Wildgen---------	0-6	15-25	15.0-20.0	6.1-7.3	---	---
	6-19	15-25	10.0-15.0	6.1-7.3	---	---
	19-60	10-25	5.0-10.0	6.1-7.3	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
125:						
Winkler	0-4	7-15	10.0-15.0	6.1-7.3	---	---
	4-21	5-15	5.0-10.0	5.6-7.3	---	---
	21-60	5-15	5.0-10.0	5.6-6.5	---	---
126:						
Wildgen	0-6	15-25	15.0-20.0	6.1-7.3	---	---
	6-19	15-25	10.0-15.0	6.1-7.3	---	---
	19-60	10-25	5.0-10.0	6.1-7.3	---	---
Winkler	0-4	7-15	10.0-15.0	6.1-7.3	---	---
	4-21	5-15	5.0-10.0	5.6-7.3	---	---
	21-60	5-15	5.0-10.0	5.6-6.5	---	---
127:						
Wildgen	0-3	15-25	15.0-20.0	6.1-7.3	---	---
	3-19	15-25	10.0-15.0	6.1-7.3	---	---
	19-60	10-25	5.0-10.0	6.1-7.3	---	---
Winkler	0-3	7-15	10.0-15.0	6.1-7.3	---	---
	3-25	5-15	5.0-10.0	5.6-7.3	---	---
	25-42	5-15	5.0-10.0	5.6-6.5	---	---
	42-60	5-15	5.0-10.0	5.6-6.5	---	---
128:						
Wildgen	0-3	15-25	15.0-20.0	6.1-7.3	---	---
	3-19	15-25	10.0-15.0	6.1-7.3	---	---
	19-60	10-25	5.0-10.0	6.1-7.3	---	---
Winkler	0-3	7-15	10.0-15.0	6.1-7.3	---	---
	3-25	5-15	5.0-10.0	5.6-7.3	---	---
	25-42	5-15	5.0-10.0	5.6-6.5	---	---
	42-60	5-15	5.0-10.0	5.6-6.5	---	---
129:						
Winfall	0-18	10-20	5.0-10.0	5.1-6.5	---	---
	18-60	10-20	5.0-10.0	5.1-6.5	---	---
130:						
Winkler	0-8	7-15	10.0-15.0	6.1-7.3	---	---
	8-25	5-15	5.0-10.0	5.6-7.3	---	---
	25-42	5-15	5.0-10.0	5.6-6.5	---	---
	42-60	5-15	5.0-10.0	5.6-6.5	---	---
131:						
Winkler	0-8	7-15	10.0-15.0	6.1-7.3	---	---
	8-25	5-15	5.0-10.0	5.6-7.3	---	---
	25-42	5-15	5.0-10.0	5.6-6.5	---	---
	42-60	5-15	5.0-10.0	5.6-6.5	---	---
132:						
Winkler	0-4	7-15	10.0-15.0	6.1-7.3	---	---
	4-21	5-15	5.0-10.0	5.6-7.3	---	---
	21-40	5-15	5.0-10.0	5.6-6.5	---	---
	40-60	5-15	5.0-10.0	5.6-6.5	---	---
133:						
Winkler	0-4	7-15	10.0-15.0	6.1-7.3	---	---
	4-21	5-15	5.0-10.0	5.6-7.3	---	---
	21-40	5-15	5.0-10.0	5.6-6.5	---	---
	40-60	5-15	5.0-10.0	5.6-6.5	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate equivalent	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
134:						
Winkler---------	0-8	7-15	10.0-15.0	6.1-7.3	---	---
	8-30	5-15	5.0-10.0	5.6-7.3	---	---
	30-47	5-15	5.0-10.0	5.6-6.5	---	---
	47-60	5-15	5.0-10.0	5.6-6.5	---	---
Rubble land.						
135:						
Winkler---------	0-4	7-15	10.0-15.0	6.1-7.3	---	---
	4-21	5-15	5.0-10.0	5.6-7.3	---	---
	21-40	5-15	5.0-10.0	5.6-6.5	---	---
	40-60	5-15	5.0-10.0	5.6-6.5	---	---
Rock outcrop.						
136:						
Xerofluvents.						
137:						
Yourame---------	0-4	7-15	10.0-15.0	5.6-7.3	---	---
	4-21	7-15	5.0-10.0	5.6-7.3	---	---
	21-48	20-35	20.0-25.0	5.6-7.3	---	---
	48-60	18-30	20.0-25.0	7.9-8.4	5-15	0-2

WATER FEATURES

Map symbol and soil name	Hydro-logic group	Frequency of flooding	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
1:							
Alberton	B	None	>6.0	---	---	---	---
2:							
Ambrant	B	None	>6.0	---	---	---	---
3:							
Ambrant	B	None	>6.0	---	---	---	---
Rochester	A	None	>6.0	---	---	---	---
Rock outcrop.							
4:							
Aquic Haploxerolls	---	None	1.7-3.3	Apparent	Apr-Jul	---	---
5:							
Aquic Udorthents	---	None	1.7-3.3	Apparent	Apr-Jul	---	---
6:							
Aquolls	---	Occasional	0.0-3.0	Apparent	Apr-Jul	---	---
Aquepts	---	Occasional	0.0-3.0	Apparent	Apr-Jul	---	---
7:							
Argixerolls	---	None	---	---	---	---	---
Haploxerolls	---	None	---	---	---	---	---
8:							
Argixerolls	---	None	---	---	---	---	---
Haploxerolls	---	None	---	---	---	---	---
9:							
Argixerolls	---	None	---	---	---	---	---
Haploxerolls	---	None	---	---	---	---	---
10:							
Argixerolls	---	None	---	---	---	---	---
Haploxerolls	---	None	---	---	---	---	---
11:							
Auggie	B	None	>6.0	---	---	---	---
12:							
Bata	B	None	>6.0	---	---	---	---
13:							
Bata	B	None	>6.0	---	---	---	---
Waldbillig	B	None	>6.0	---	---	---	---
14:							
Beeskove	B	None	>6.0	---	---	---	---
15:							
Beeskove	B	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro- logic group	Frequency of flooding	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
15:							
Rock outcrop.							
16:							
Bigarm----------	B	None	>6.0	---	---	---	---
17:							
Bigarm----------	B	None	>6.0	---	---	---	---
18:							
Bigarm----------	B	None	>6.0	---	---	---	---
19:							
Bigarm----------	B	None	>6.0	---	---	---	---
20:							
Bigarm----------	B	None	>6.0	---	---	---	---
Rock outcrop.							
21:							
Biglake---------	A	None	>6.0	---	---	---	---
22:							
Biglake---------	A	None	>6.0	---	---	---	---
23:							
Bignell---------	C	None	>6.0	---	---	---	---
24:							
Bignell---------	C	None	>6.0	---	---	---	---
Winkler---------	B	None	>6.0	---	---	---	---
25:							
Bignell---------	C	None	>6.0	---	---	---	---
Winkler---------	B	None	>6.0	---	---	---	---
26:							
Borohemists-----	---	None	---	Apparent	Jan-Dec	Long	1.0
27:							
Chickaman-------	B	None	>6.0	---	---	---	---
28:							
Chickaman-------	B	None	>6.0	---	---	---	---
29:							
Coerock---------	D	None	>6.0	---	---	---	---
Rock outcrop.							
30:							
Coerock---------	D	None	>6.0	---	---	---	---
Rock outcrop.							
31:							
Courville-------	B	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Frequency of flooding	High water table and ponding				
			Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
32:							
Courville-------	B	None	>6.0	---	---	---	---
Mitten----------	B	None	>6.0	---	---	---	---
33:							
Crow------------	C	None	>6.0	---	---	---	---
34:							
Desmet----------	B	None	>6.0	---	---	---	---
35:							
Elkner----------	B	None	>6.0	---	---	---	---
Ovando----------	A	None	>6.0	---	---	---	---
36:							
Evaro-----------	B	None	>6.0	---	---	---	---
37:							
Evaro-----------	B	None	>6.0	---	---	---	---
38:							
Felan-----------	B	None	>6.0	---	---	---	---
39:							
Felan-----------	B	None	>6.0	---	---	---	---
40:							
Felan-----------	B	None	>6.0	---	---	---	---
41:							
Felan-----------	B	None	>6.0	---	---	---	---
42:							
Glaciercreek----	A	None	>6.0	---	---	---	---
43:							
Glaciercreek variant--------	B	None	>6.0	---	---	---	---
Glaciercreek----	A	None	>6.0	---	---	---	---
44:							
Grantsdale------	B	None	>6.0	---	---	---	---
45:							
Grassvalley-----	D	None	>6.0	---	---	---	---
46:							
Grassvalley-----	D	None	>6.0	---	---	---	---
47:							
Grassvalley-----	D	None	>6.0	---	---	---	---
48:							
Grassvalley-----	D	None	>6.0	---	---	---	---
49:							
Greenough-------	B	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Frequency of flooding	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
50:							
Hagstadt	C	None	>6.0	---	---	---	---
51:							
Half Moon	B	None	>6.0	---	---	---	---
52:							
Hanaker	C	None	>6.0	---	---	---	---
53:							
Hollandlake	B	None	>6.0	---	---	---	---
54:							
Hollandlake	B	None	>6.0	---	---	---	---
Bata	B	None	>6.0	---	---	---	---
55:							
Hollandlake	B	None	>6.0	---	---	---	---
Bata	B	None	>6.0	---	---	---	---
56:							
Holloway	B	None	>6.0	---	---	---	---
57:							
Holloway	B	None	>6.0	---	---	---	---
58:							
Holloway	B	None	>6.0	---	---	---	---
59:							
Holloway	B	None	>6.0	---	---	---	---
60:							
Holloway	B	None	>6.0	---	---	---	---
Rock outcrop.							
61:							
Jimlake	B	None	>6.0	---	---	---	---
62:							
Jimlake	B	None	>6.0	---	---	---	---
63:							
Lantern	B	None	>6.0	---	---	---	---
64:							
Lantern	B	None	>6.0	---	---	---	---
65:							
Lantern	B	None	>6.0	---	---	---	---
Rock outcrop.							
66:							
Lolopeak	A	None	>6.0	---	---	---	---
67:							
Lolopeak	A	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Frequency of flooding	High water table and ponding				
			Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
67:							
Rock outcrop.							
68:							
Lubrecht--------	C	None	>6.0	---	---	---	---
69:							
Mitten----------	B	None	>6.0	---	---	---	---
70:							
Mitten----------	B	None	>6.0	---	---	---	---
Sharrott--------	D	None	>6.0	---	---	---	---
71:							
Mitten----------	B	None	>6.0	---	---	---	---
Tevis-----------	B	None	>6.0	---	---	---	---
72:							
Moiese----------	B	None	>6.0	---	---	---	---
73:							
Orthents--------	---	None	---	---	---	---	---
74:							
Ovando----------	A	None	>6.0	---	---	---	---
Elkner----------	B	None	>6.0	---	---	---	---
Rock outcrop.							
75:							
Perma-----------	B	None	>6.0	---	---	---	---
76:							
Perma-----------	B	None	>6.0	---	---	---	---
77:							
Perma-----------	B	None	>6.0	---	---	---	---
78:							
Perma variant---	B	None	>6.0	---	---	---	---
79:							
Perma variant---	B	None	>6.0	---	---	---	---
Perma-----------	B	None	>6.0	---	---	---	---
80:							
Petty-----------	B	None	>6.0	---	---	---	---
81:							
Petty-----------	B	None	>6.0	---	---	---	---
82:							
Petty-----------	B	None	>6.0	---	---	---	---
83:							
Petty-----------	B	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Frequency of flooding	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
84:							
Petty	B	None	>6.0	---	---	---	---
85:							
Petty	B	None	>6.0	---	---	---	---
Rock outcrop.							
86:							
Phillcher	B	None	>6.0	---	---	---	---
87:							
Phillcher	B	None	>6.0	---	---	---	---
Rock outcrop.							
88:							
Pits.							
89:							
Repp	B	None	>6.0	---	---	---	---
90:							
Repp	B	None	>6.0	---	---	---	---
91:							
Repp	B	None	>6.0	---	---	---	---
92:							
Repp	B	None	>6.0	---	---	---	---
Rock outcrop.							
93:							
Riverwash	---	Frequent	---	---	---	---	---
94:							
Rock outcrop.							
Rubble land.							
95:							
Rumblecreek	B	None	>6.0	---	---	---	---
96:							
Selway	B	None	>6.0	---	---	---	---
97:							
Selway	B	None	>6.0	---	---	---	---
98:							
Selway	B	None	>6.0	---	---	---	---
99:							
Sharrott	D	None	>6.0	---	---	---	---
Rock outcrop.							
100:							
Shooflin	D	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro- logic group	Frequency of flooding	High water table and ponding				
			Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
101:							
Tally variant---	B	None	>6.0	---	---	---	---
102:							
Tevis-----------	B	None	>6.0	---	---	---	---
103:							
Tevis-----------	B	None	>6.0	---	---	---	---
Mitten----------	B	None	>6.0	---	---	---	---
104:							
Tevis-----------	B	None	>6.0	---	---	---	---
Mitten----------	B	None	>6.0	---	---	---	---
Rock outcrop.							
105:							
Totelake--------	B	None	>6.0	---	---	---	---
106:							
Totelake--------	B	None	>6.0	---	---	---	---
107:							
Totelake--------	B	None	>6.0	---	---	---	---
108:							
Trapps----------	B	None	>6.0	---	---	---	---
109:							
Trapps----------	B	None	>6.0	---	---	---	---
110:							
Turrah----------	C	None	1.0-2.0	Apparent	May-Jul	---	---
111:							
Udifluvents-----	---	Frequent	3.0-5.0	Apparent	Apr-Jul	---	---
112:							
Udorthents------	---	None	---	---	---	---	---
Glaciercreek----	A	None	>6.0	---	---	---	---
113:							
Upsata----------	B	None	>6.0	---	---	---	---
114:							
Urban land.							
115:							
Waldbillig------	B	None	>6.0	---	---	---	---
116:							
Waldbillig------	B	None	>6.0	---	---	---	---
117:							
Waldbillig------	B	None	>6.0	---	---	---	---
Auggie----------	B	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Frequency of flooding	High water table and ponding				
			Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
118:							
Waldbillig------	B	None	>6.0	---	---	---	---
Holloway--------	B	None	>6.0	---	---	---	---
119:							
Waldbillig------	B	None	>6.0	---	---	---	---
Holloway--------	B	None	>6.0	---	---	---	---
120:							
Waldbillig------	B	None	>6.0	---	---	---	---
Holloway--------	B	None	>6.0	---	---	---	---
121:							
Waldbillig------	B	None	>6.0	---	---	---	---
Holloway--------	B	None	>6.0	---	---	---	---
122:							
Whitore---------	B	None	>6.0	---	---	---	---
123:							
Whitore---------	B	None	>6.0	---	---	---	---
124:							
Wildgen---------	B	None	>6.0	---	---	---	---
125:							
Wildgen---------	B	None	>6.0	---	---	---	---
Winkler---------	B	None	>6.0	---	---	---	---
126:							
Wildgen---------	B	None	>6.0	---	---	---	---
Winkler---------	B	None	>6.0	---	---	---	---
127:							
Wildgen---------	B	None	>6.0	---	---	---	---
Winkler---------	B	None	>6.0	---	---	---	---
128:							
Wildgen---------	B	None	>6.0	---	---	---	---
Winkler---------	B	None	>6.0	---	---	---	---
129:							
Winfall---------	B	None	>6.0	---	---	---	---
130:							
Winkler---------	B	None	>6.0	---	---	---	---
131:							
Winkler---------	B	None	>6.0	---	---	---	---
132:							
Winkler---------	B	None	>6.0	---	---	---	---

WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Frequency of flooding	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
			Ft				Ft
133:							
Winkler----------	B	None	>6.0	---	---	---	---
134:							
Winkler----------	B	None	>6.0	---	---	---	---
Rubble land.							
135:							
Winkler----------	B	None	>6.0	---	---	---	---
Rock outcrop.							
136:							
Xerofluvents-----	---	Frequent	---	---	---	---	---
137:							
Yourame----------	B	None	>6.0	---	---	---	---

SOIL FEATURES

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
1:					
Alberton	>60	---	Moderate	Moderate	Low
2:					
Ambrant	>60	---	Moderate	Moderate	Moderate
3:					
Ambrant	>60	---	Moderate	Moderate	Moderate
Rochester	>60	---	Low	Moderate	Low
Rock outcrop.					
4:					
Aquic Haploxerolls	>60	---	---	---	---
5:					
Aquic Udorthents	>60	---	---	---	---
6:					
Aquolls	>60	---	---	---	---
Aquepts	>60	---	---	---	---
7:					
Argixerolls	>60	---	---	---	---
Haploxerolls	>60	---	---	---	---
8:					
Argixerolls	>60	---	---	---	---
Haploxerolls	>60	---	---	---	---
9:					
Argixerolls	>60	---	---	---	---
Haploxerolls	>60	---	---	---	---
10:					
Argixerolls	>60	---	---	---	---
Haploxerolls	>60	---	---	---	---
11:					
Auggie	>60	---	High	Moderate	Moderate
12:					
Bata	>60	---	Moderate	Moderate	Moderate
13:					
Bata	>60	---	Moderate	Moderate	Moderate
Waldbillig	>60	---	Moderate	Moderate	Moderate
14:					
Beeskove	>60	---	Moderate	High	Low
15:					
Beeskove	>60	---	Moderate	High	Low

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
15:					
Rock outcrop.					
16:					
Bigarm----------	>60	---	Moderate	Moderate	Low
17:					
Bigarm----------	>60	---	Moderate	Moderate	Low
18:					
Bigarm----------	>60	---	Moderate	Moderate	Low
19:					
Bigarm----------	>60	---	Moderate	Moderate	Low
20:					
Bigarm----------	>60	---	Moderate	Moderate	Low
Rock outcrop.					
21:					
Biglake---------	>60	---	Low	Moderate	Low
22:					
Biglake---------	>60	---	Low	Moderate	Low
23:					
Bignell---------	>60	---	Moderate	Moderate	Moderate
24:					
Bignell---------	>60	---	Moderate	Moderate	Moderate
Winkler---------	>60	---	Moderate	Moderate	Moderate
25:					
Bignell---------	>60	---	Moderate	Moderate	Moderate
Winkler---------	>60	---	Moderate	Moderate	Moderate
26:					
Borohemists-----	>60	---	---	---	---
27:					
Chickaman-------	>60	---	High	Moderate	Low
28:					
Chickaman-------	>60	---	High	Moderate	Low
29:					
Coerock---------	10-20	Hard	Moderate	Moderate	Moderate
Rock outcrop.					
30:					
Coerock---------	10-20	Hard	Moderate	Moderate	Moderate
Rock outcrop.					
31:					
Courville-------	>60	---	Moderate	Moderate	Moderate

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
32:					
Courville-------	>60	---	Moderate	Moderate	Moderate
Mitten----------	>60	---	Moderate	Moderate	Moderate
33:					
Crow------------	>60	---	Moderate	Moderate	Moderate
34:					
Desmet----------	>60	---	Moderate	High	Low
35:					
Elkner----------	>60	---	Moderate	Moderate	Moderate
Ovando----------	>60	---	Low	Moderate	Moderate
36:					
Evaro-----------	>60	---	Moderate	Moderate	Moderate
37:					
Evaro-----------	>60	---	Moderate	Moderate	Moderate
38:					
Felan-----------	>60	---	Moderate	High	Moderate
39:					
Felan-----------	>60	---	Moderate	High	Moderate
40:					
Felan-----------	>60	---	Moderate	High	Moderate
41:					
Felan-----------	>60	---	Moderate	High	Moderate
42:					
Glaciercreek----	>60	---	Low	Moderate	Moderate
43:					
Glaciercreek variant--------	>60	---	Moderate	Moderate	Moderate
Glaciercreek----	>60	---	Low	Moderate	Moderate
44:					
Grantsdale------	>60	---	Moderate	High	Low
45:					
Grassvalley-----	>60	---	Moderate	High	Low
46:					
Grassvalley-----	>60	---	Moderate	High	Low
47:					
Grassvalley-----	>60	---	Moderate	High	Low
48:					
Grassvalley-----	>60	---	Moderate	High	Low
49:					
Greenough-------	>60	---	High	Moderate	Low

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
50:					
Hagstadt	20-40	Soft	High	Moderate	Low
51:					
Half Moon	>60	---	Moderate	High	High
52:					
Hanaker	>60	---	Moderate	High	Low
53:					
Hollandlake	>60	---	Moderate	Moderate	Moderate
54:					
Hollandlake	>60	---	Moderate	Moderate	Moderate
Bata	>60	---	Moderate	Moderate	Moderate
55:					
Hollandlake	>60	---	Moderate	Moderate	Moderate
Bata	>60	---	Moderate	Moderate	Moderate
56:					
Holloway	>60	---	Moderate	Moderate	Moderate
57:					
Holloway	>60	---	Moderate	Moderate	Moderate
58:					
Holloway	>60	---	Moderate	Moderate	Moderate
59:					
Holloway	>60	---	Moderate	Moderate	Moderate
60:					
Holloway	>60	---	Moderate	Moderate	Moderate
Rock outcrop.					
61:					
Jimlake	>60	---	Moderate	Moderate	Moderate
62:					
Jimlake	>60	---	Moderate	Moderate	Moderate
63:					
Lantern	>60	---	Moderate	Moderate	Low
64:					
Lantern	>60	---	Moderate	Moderate	Low
65:					
Lantern	>60	---	Moderate	Moderate	Low
Rock outcrop.					
66:					
Lolopeak	>60	---	Moderate	Moderate	Moderate
67:					
Lolopeak	>60	---	Moderate	Moderate	Moderate

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
67:					
Rock outcrop.					
68:					
Lubrecht	20-40	Soft	Moderate	Moderate	Moderate
69:					
Mitten	>60	---	Moderate	Moderate	Moderate
70:					
Mitten	>60	---	Moderate	Moderate	Moderate
Sharrott	10-20	Hard	Moderate	Moderate	Moderate
71:					
Mitten	>60	---	Moderate	Moderate	Moderate
Tevis	>60	---	Moderate	Moderate	Moderate
72:					
Moiese	>60	---	Low	High	Low
73:					
Orthents	>60	---	---	---	---
74:					
Ovando	>60	---	Low	Moderate	Moderate
Elkner	>60	---	Moderate	Moderate	Moderate
Rock outcrop.					
75:					
Perma	>60	---	Moderate	Moderate	Low
76:					
Perma	>60	---	Moderate	Moderate	Low
77:					
Perma	>60	---	Moderate	Moderate	Low
78:					
Perma variant	>60	---	Moderate	High	Low
79:					
Perma variant	>60	---	Moderate	High	Low
Perma	>60	---	Moderate	Moderate	Low
80:					
Petty	>60	---	Moderate	Moderate	Moderate
81:					
Petty	>60	---	Moderate	Moderate	Moderate
82:					
Petty	>60	---	Moderate	Moderate	Moderate
83:					
Petty	>60	---	Moderate	Moderate	Moderate

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
84:					
Petty	>60	---	Moderate	Moderate	Moderate
85:					
Petty	>60	---	Moderate	Moderate	Moderate
Rock outcrop.					
86:					
Phillcher	>60	---	Moderate	Moderate	Moderate
87:					
Phillcher	>60	---	Moderate	Moderate	Moderate
Rock outcrop.					
88:					
Pits.					
89:					
Repp	>60	---	Moderate	High	Low
90:					
Repp	>60	---	Moderate	High	Low
91:					
Repp	>60	---	Moderate	High	Low
92:					
Repp	>60	---	Moderate	High	Low
Rock outcrop.					
93:					
Riverwash.					
94:					
Rock outcrop.					
Rubble land.					
95:					
Rumblecreek	>60	---	Moderate	Moderate	Moderate
96:					
Selway	>60	---	Moderate	Moderate	Moderate
97:					
Selway	>60	---	Moderate	Moderate	Moderate
98:					
Selway	>60	---	Moderate	Moderate	Moderate
99:					
Sharrott	10-20	Hard	Moderate	Moderate	Moderate
Rock outcrop.					
100:					
Shooflin	40-60	Soft	Moderate	High	High

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In				
101:					
Tally variant---	>60	---	Low	Moderate	Low
102:					
Tevis-----------	>60	---	Moderate	Moderate	Moderate
103:					
Tevis-----------	>60	---	Moderate	Moderate	Moderate
Mitten----------	>60	---	Moderate	Moderate	Moderate
104:					
Tevis-----------	>60	---	Moderate	Moderate	Moderate
Mitten----------	>60	---	Moderate	Moderate	Moderate
Rock outcrop.					
105:					
Totelake--------	>60	---	Moderate	Moderate	Low
106:					
Totelake--------	>60	---	Moderate	Moderate	Low
107:					
Totelake--------	>60	---	Moderate	Moderate	Low
108:					
Trapps----------	>60	---	Moderate	High	Moderate
109:					
Trapps----------	>60	---	Moderate	High	Moderate
110:					
Turrah----------	>60	---	High	Moderate	Moderate
111:					
Udifluvents-----	>60	---	---	---	---
112:					
Udorthents------	>60	---	---	---	---
Glaciercreek----	>60	---	Low	Moderate	Moderate
113:					
Upsata----------	>60	---	Low	Moderate	Moderate
114:					
Urban land.					
115:					
Waldbillig------	>60	---	Moderate	Moderate	Moderate
116:					
Waldbillig------	>60	---	Moderate	Moderate	Moderate
117:					
Waldbillig------	>60	---	Moderate	Moderate	Moderate
Auggie----------	>60	---	High	Moderate	Moderate

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In				
118:					
Waldbillig	>60	---	Moderate	Moderate	Moderate
Holloway	>60	---	Moderate	Moderate	Moderate
119:					
Waldbillig	>60	---	Moderate	Moderate	Moderate
Holloway	>60	---	Moderate	Moderate	Moderate
120:					
Waldbillig	>60	---	Moderate	Moderate	Moderate
Holloway	>60	---	Moderate	Moderate	Moderate
121:					
Waldbillig	>60	---	Moderate	Moderate	Moderate
Holloway	>60	---	Moderate	Moderate	Moderate
122:					
Whitore	>60	---	Moderate	High	Low
123:					
Whitore	>60	---	Moderate	High	Low
124:					
Wildgen	>60	---	Moderate	Moderate	Low
125:					
Wildgen	>60	---	Moderate	Moderate	Low
Winkler	>60	---	Moderate	Moderate	Moderate
126:					
Wildgen	>60	---	Moderate	Moderate	Low
Winkler	>60	---	Moderate	Moderate	Moderate
127:					
Wildgen	>60	---	Moderate	Moderate	Low
Winkler	>60	---	Moderate	Moderate	Moderate
128:					
Wildgen	>60	---	Moderate	Moderate	Low
Winkler	>60	---	Moderate	Moderate	Moderate
129:					
Winfall	>60	---	Moderate	Moderate	Moderate
130:					
Winkler	>60	---	Moderate	Moderate	Moderate
131:					
Winkler	>60	---	Moderate	Moderate	Moderate
132:					
Winkler	>60	---	Moderate	Moderate	Moderate

SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
133:					
Winkler----------	>60	---	Moderate	Moderate	Moderate
134:					
Winkler----------	>60	---	Moderate	Moderate	Moderate
Rubble land.					
135:					
Winkler----------	>60	---	Moderate	Moderate	Moderate
Rock outcrop.					
136:					
Xerofluvents-----	>60	---	---	---	---
137:					
Yourame----------	>60	---	Moderate	High	Moderate

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hill slopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillite. Weakly metamorphosed mudstone or shale.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hill slopes. Back slopes in profile are commonly steep and linear and descend to a foot slope. In terms of gradational process, back slopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board one foot wide, one foot long, and one inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep or very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, a felled tree generally is reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation by use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Cirque. A semicircular, concave, bowllike area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from adjacent stands.

Climax plant community. The plant community on a

given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forest land capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion; in areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that

part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit the use of a full stripcropping pattern.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low

hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A term used to identify a generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is more often applied to cliffs resulting from differential erosion.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between the individuals. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. A firebreak also serves as a line from which to work and to facilitate the movement of fire fighters and

equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothills. A region of relatively low, rounded hills at the base of a mountain range.

Foot slope. The geomorphic component that forms the inner, gently inclined surface at the base of a hill slope. The surface profile is dominantly concave. In terms of gradational processes, a foot slope is a transition zone between an upslope site of erosion (back slope) and a downslope site of deposition (toe slope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. A gullied map unit is one that has numerous gullies.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that

increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and are less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low-residue crops. Crops such as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of the tree.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of limited summit area and generally having steep sides (slopes greater than 25 percent) and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are primarily formed by deep-seated earth movements or volcanic action and secondarily by differential erosion.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed

organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors

responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	less than 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata mainly red in color and composed largely of sandstone and shale.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently

rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transition zone from the back slope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine-textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks,

prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are: *platy* (laminated), *prismatic (vertical axis of aggregates longer than horizontal), columnar* (prisms with

rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances. It commonly is a massive arcuate ridge or complex of ridges underlain by till and other types of drift.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill. Toe slopes are commonly gentle and linear in profile.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Waterspreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

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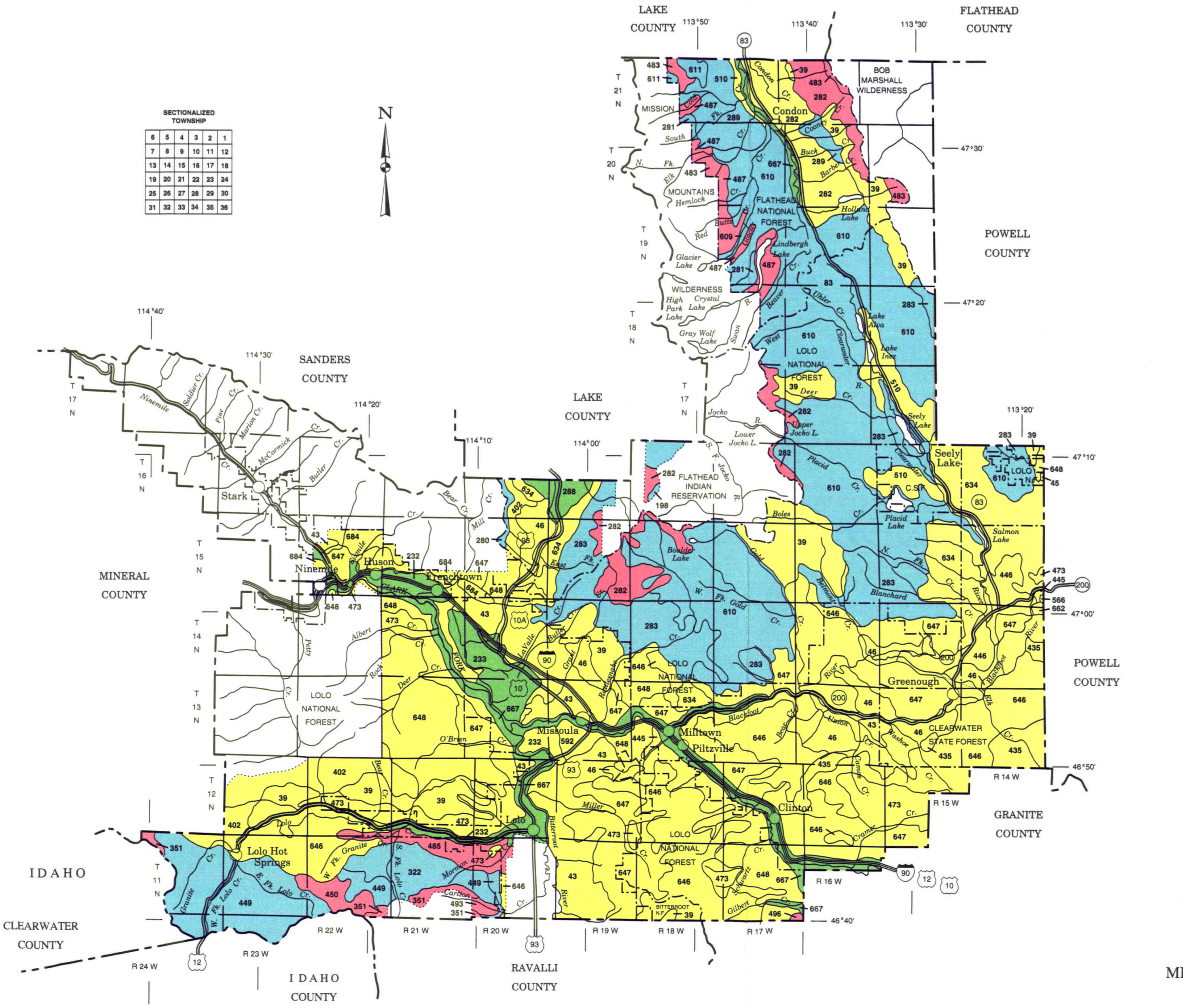


SOIL LEGEND*

DOMINANTLY SOILS AND MISCELLANEOUS AREAS ON FLOOD PLAINS, STREAM TERRACES, AND ALLUVIAL FANS

- 232 Grantsdale - Moiese - Alberton
- 233 Grassvalley - Desmet - Alberton
- 288 Moiese - Bigarm - Xerofluvents
- 592 Urban land - Moiese - Alberton
- 667 Xerofluvents - Riverwash - Water

DOMINANTLY SOILS AND MISCELLANEOUS AREAS ON MOUNTAINS, MORAINES, HILLS, AND STREAM TERRACES

- 39 Beeskove - Repp - Felan
- 43 Bigarm - Haploxerolls - Bignell
- 45 Bignell - Yourame - Perma
- 46 Bignell - Crow - Greenough
- 402 Mitten - Winkler - Tevis
- 435 Ovando - Elkner - Ambrant
- 445 Perma - Wildgen - Yourame
- 446 Perma - Hanaker
- 473 Repp - Whitore - Winkler
- 510 Rumblecreek - Winfall - Hollandlake
- 566 Tevis - Bignell - Yourame
- 634 Wildgen - Winfall - Rumblecreek
- 646 Winkler - Evaro - Tevis
- 647 Winkler - Evaro - Rock outcrop
- 648 Winkler - Tevis - Mitten
- 662 Repp - Yourame - Trapps
- 684 Yourame - Greenough - Winkler

DOMINANTLY SOILS AND ROCK OUTCROP ON MORAINS, MOUNTAINS, CIRQUE BASINS, AND LAKE PLAINS

- 198 Felan - Winfall
- 280 Holloway - Mitten - Waldbillig
- 281 Holloway - Evaro - Mitten
- 283 Holloway - Rock outcrop - Winkler
- 289 Jimlake - Bata - Auggie
- 322 Lantern - Chickaman - Lolopeak
- 449 Petty - Lolopeak - Selway
- 609 Waldbillig - Courville - Bata
- 610 Waldbillig - Holloway - Felan
- 611 Waldbillig - Pillcher - Coerock

DOMINANTLY ROCK OUTCROP, RUBBLE LAND AND SOILS ON MOUNTAINS

- 282 Rock outcrop - Holloway - Phillcher
- 351 Lolopeak - Rubble land - Rock outcrop
- 450 Petty - Rock outcrop
- 483 Rock outcrop - Coerock - Phillcher
- 485 Rock outcrop
- 487 Rock outcrop - Holloway -Coerock
- 493 Rock outcrop - Rubble land - Lolopeak
- 496 Rock outcrop - Evaro - Holloway

*The units on this legend are described in the text under the heading " General Soil Map Units."

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
FOREST SERVICE
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
BUREAU OF LAND MANAGEMENT
MONTANA AGRICULTURAL EXPERIMENT STATION

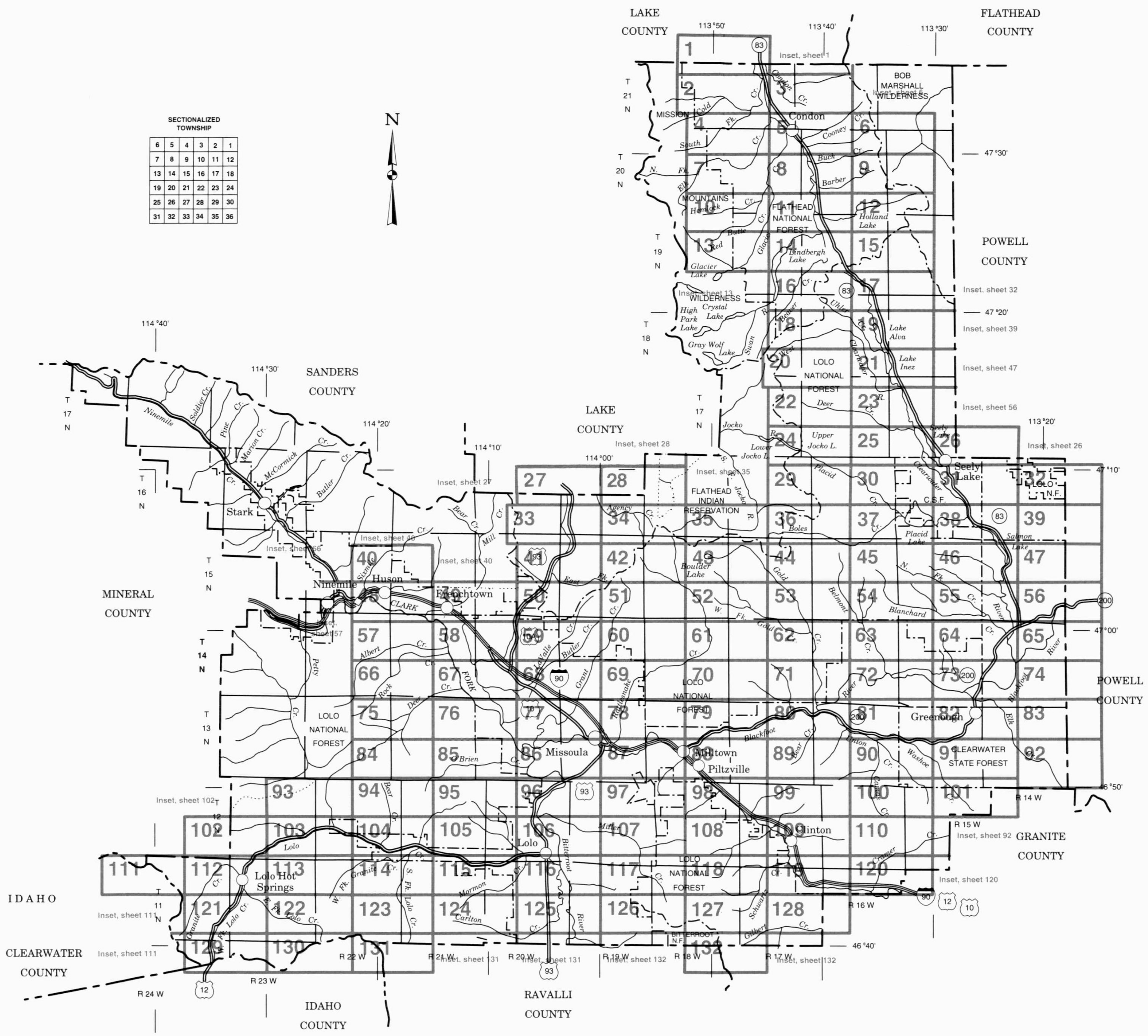
GENERAL SOIL MAP

MISSOULA COUNTY AREA, MONTANA

Scale 1:506,880

2 0 2 4 6 8 Mi.

2 0 8 16 Km.



INDEX TO MAP SHEETS

MISSOULA COUNTY AREA, MONTANA

Scale 1:506,880

2 0 2 4 6 8 Mi.

2 0 8 16 Km.

SOIL LEGEND

SYMBOL	NAME
1	Alberton very fine sandy loam, 0 to 2 percent slopes
2	Ambrant gravelly sandy loam, 15 to 30 percent slopes
3	Ambrant-Rochester, warm-Rock outcrop complex, 30 to 60 percent slopes
4	Aquic Haploxerolls, 0 to 2 percent slopes
5	Aquic Udorthents, 0 to 2 percent slopes
6	Aquolls and Aquepts, 0 to 2 percent slopes
7	Argixerolls-Haploxerolls complex, 0 to 4 percent slopes
8	Argixerolls-Haploxerollscomplex, 4 to 15 percent slopes
9	Argixerolls-Haploxerolls complex, 15 to 30 percent slopes
10	Argixerolls-Haploxerolls complex, 30 to 60 percent slopes
11	Auggie silt loam, 4 to 15 percent slopes
12	Bata gravelly silt loam, cool, 2 to 8 percent slopes
13	Bata-Waldbillig gravelly silt loams, 4 to 30 percent slopes
14	Beeskove gravelly loam, 30 to 60 percent slopes
15	Beeskove-Rock outcrop complex, 50 to 80 percent slopes
16	Bigarm gravelly loam, 0 to 4 percent slopes
17	Bigarm gravelly loam, 4 to 15 percent slopes
18	Bigarm gravelly loam, 15 to 30 percent slopes
19	Bigarm gravelly loam, 30 to 60 percent slopes
20	Bigarm-Rock outcrop complex, 30 to 60 percent slopes
21	Biglake gravelly sandy loam, 8 to 15 percent slopes
22	Biglake gravelly sandy loam, 15 to 30 percent slopes
23	Bignell gravelly loam, 8 to 30 percent slopes
24	Bignell-Winkler, cool, complex, 30 to 60 percent slopes
25	Bignell, warm-Winkler complex, 30 to 60 percent slopes
26	Borohemists, 0 to 2 percent slopes
27	Chickaman silt loam, 8 to 30 percent slopes
28	Chickaman silt loam, 30 to 60 percent slopes
29	Coerock-Rock outcrop complex, 4 to 30 percent slopes
30	Coerock-Rock outcrop complex, 50 to 80 percent slopes
31	Courville gravelly silt loam, 8 to 30 percent slopes
32	Courville-Mitten gravelly silt loams, 30 to 60 percent slopes
33	Crow silt loam, 4 to 15 percent slopes
34	Desmet loam, 0 to 2 percent slopes
35	Elkner-Ovando complex, 8 to 30 percent slopes
36	Evaro gravelly loam, 8 to 30 percent slopes
37	Evaro gravelly loam, 30 to 60 percent slopes
38	Felan gravelly silt loam, 8 to 30 percent slopes
39	Felan gravelly silt loam, 30 to 60 percent slopes
40	Felan gravelly silt loam, cool, 8 to 30 percent slopes
41	Felan gravelly silt loam, cool, 30 to 60 percent slopes
42	Glaciercreek gravelly silt loam, 0 to 4 percent slopes
43	Glaciercreek variant-Glaciercreek complex, 4 to 20 percent slopes
44	Grantsdale loam, 0 to 2 percent slopes
45	Grassvalley silty clay loam, 0 to 4 percent slopes
46	Grassvalley silty clay loam, 4 to 8 percent slopes
47	Grassvalley silty clay loam, 8 to 15 percent slopes
48	Grassvalley silty clay loam, 15 to 30 percent slopes
49	Greenough silt loam, 4 to 15 percent slopes
50	Hagstadt silt loam, 4 to 25 percent slopes
51	Half Moon silt loam, 4 to 8 percent slopes
52	Hanaker silt loam, 0 to 6 percent slopes
53	Hollandlake gravelly loam, 4 to 30 percent slopes
54	Hollandlake-Bata complex, 4 to 30 percent slopes
55	Hollandlake-Bata complex, 30 to 60 percent slopes
56	Holloway gravelly silt loam, 8 to 30 percent slopes
57	Holloway gravelly silt loam, 30 to 60 percent slopes
58	Holloway gravelly silt loam, cool, 8 to 30 percent slopes
59	Holloway gravelly silt loam, cool, 30 to 60 percent slopes
60	Holloway-Rock outcrop complex, 50 to 80 percent slopes
61	Jimlake gravelly silt loam, 4 to 30 percent slopes
62	Jimlake gravelly silt loam, 30 to 60 percent slopes
63	Lantern gravelly sandy loam, 8 to 30 percent slopes
64	Lantern gravelly sandy loam, 30 to 60 percent slopes
65	Lantern-Rock outcrop complex, 50 to 80 percent slopes
66	Lolopeak bouldery loam, 50 to 80 percent slopes
67	Lolopeak-Rock outcrop complex, 50 to 80 percent slopes
68	Lubrecht silt loam, 4 to 15 percent slopes
69	Mitten gravelly silt loam, 30 to 60 percent slopes
70	Mitten-Sharrott, cool, complex, 15 to 40 percent slopes
71	Mitten-Tevis complex, 30 to 60 percent slopes
72	Moiese gravelly loam, 0 to 2 percent slopes
73	Orthents, 0 to 4 percent slopes
74	Ovando-Elkner-Rock outcrop complex, 30 to 60 percent slopes
75	Perma gravelly loam, 0 to 4 percent slopes
76	Perma gravelly loam, 20 to 45 percent slopes
77	Perma stony loam, 2 to 12 percent slopes
78	Perma variant stony silt loam, 2 to 8 percent slopes
79	Perma variant-Perma complex, 4 to 30 percent slopes
80	Petty gravelly loam, 8 to 30 percent slopes
81	Petty gravelly loam, 30 to 60 percent slopes
82	Petty bouldery loam, 30 to 60 percent slopes
83	Petty gravelly loam, cool, 8 to 30 percent slopes
84	Petty bouldery loam, cool, 50 to 80 percent slopes
85	Petty, cool-Rock outcrop complex, 50 to 80 percent slopes
86	Phillcher silt loam, 4 to 30 percent slopes
87	Phillcher-Rock outcrop complex, 50 to 80 percent slopes
88	Pits, gravel
89	Repp very gravelly loam, 30 to 60 percent slopes
90	Repp very gravelly loam, cool, 8 to 30 percent slopes
91	Repp very gravelly loam, cool, 30 to 60 percent slopes
92	Repp-Rock outcrop complex, 50 to 80 percent slopes
93	Riverwash
94	Rock outcrop-Rubble land complex
95	Rumblecreek gravelly loam, 4 to 30 percent slopes
96	Selway very gravelly sandy loam, 8 to 30 percent slopes
97	Selway gravelly sandy loam, 30 to 60 percent slopes
98	Selway bouldery sandy loam, 30 to 60 percent slopes
99	Sharrott-Rock outcrop complex, 4 to 30 percent slopes
100	Shooflin silt loam, 4 to 15 percent slopes
101	Tally variant sandy loam, 0 to 4 percent slopes
102	Tevis gravelly loam, 30 to 60 percent slopes
103	Tevis-Mitten complex, 8 to 30 percent slopes
104	Tevis-Mitten-Rock outcrop complex, 45 to 70 percent slopes
105	Totelake gravelly loam, 2 to 8 percent slopes
106	Totelake gravelly loam, 8 to 30 percent slopes
107	Totelake extremely stony loam, 2 to 8 percent slopes
108	Trapps gravelly loam, 8 to 30 percent slopes
109	Trapps gravelly loam, 30 to 60 percent slopes
110	Turrah silty clay loam, 0 to 2 percent slopes
111	Udifluvents, 0 to 2 percent slopes
112	Udorthents-Glaciercreek complex, 0 to 8 percent slopes
113	Upsata gravelly fine sandy loam, 2 to 8 percent slopes
114	Urban land
115	Waldbillig gravelly silt loam, 4 to 30 percent slopes
116	Waldbillig gravelly silt loam, 30 to 60 percent slopes
117	Waldbillig-Auggie complex, 4 to 15 percent slopes
118	Waldbillig-Holloway gravelly silt loams, 8 to 30 percent slopes
119	Waldbillig-Holloway gravelly silt loams, 30 to 60 percent slopes
120	Waldbillig-Holloway gravelly silt loams, cool, 8 to 30 percent slopes
121	Waldbillig-Holloway gravelly silt loams, cool, 30 to 60 percent slopes
122	Whitore gravelly clay loam, 8 to 30 percent slopes
123	Whitore gravelly clay loam, 30 to 60 percent slopes
124	Wildgen gravelly loam, 4 to 30 percent slopes
125	Wildgen-Winkler, cool, gravelly loams, 15 to 30 percent slopes
126	Wildgen-Winkler, cool, gravelly loams, 30 to 60 percent slopes
127	Wildgen, dry-Winkler complex, 15 to 30 percent slopes
128	Wildgen, dry-Winkler complex, 30 to 60 percent slopes
129	Winfall gravelly loam, 4 to 30 percent slopes
130	Winkler very gravelly sandy loam, 8 to 30 percent slopes
131	Winkler very gravelly sandy loam, 30 to 60 percent slopes
132	Winkler gravelly loam, cool, 8 to 30 percent slopes
133	Winkler gravelly loam, cool, 30 to 60 percent slopes
134	Winkler-Rubble land complex, 50 to 80 percent slopes
135	Winkler, cool-Rock outcrop complex, 50 to 80 percent slopes
136	Xerofluvents, 0 to 2 percent slopes
137	Yourame gravelly loam, 4 to 30 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label) — Davis Airstrip

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 173
- Federal — 287
- State — 52
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable) — water

PITS — w

- Gravel pit (2 acres or less)
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water (more than 5 acres); w (2 to 5 acres)
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot (2 acres or less)

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 10 137

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot (2 to 5 acres)
- Gravelly spot (2 to 5 acres)
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale) (2 to 5 acres)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

1

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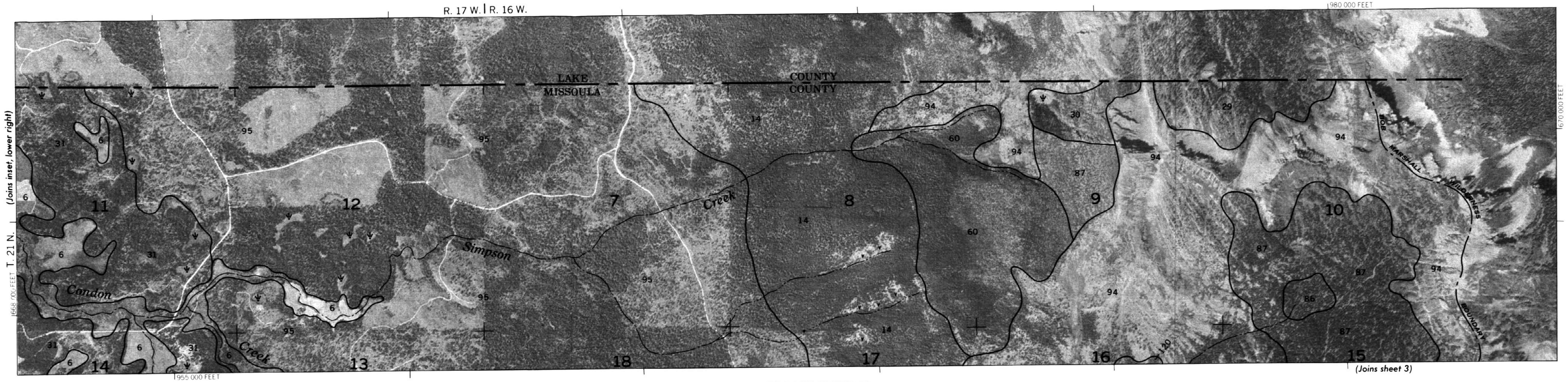
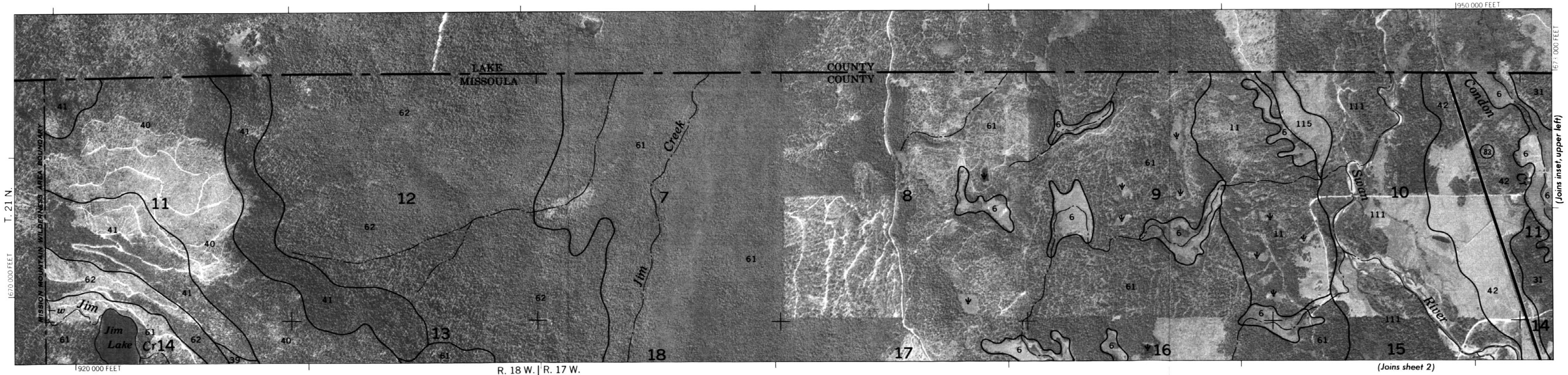


2000 AND 5000-FOOT GRID TICKS



3000 AND 5000-FOOT GRID TICKS

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

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MISSOULA COUNTY AREA, MONTANA NO. 1

2

N

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 2

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MISSOULA COUNTY AREA, MONTANA NO. 3

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

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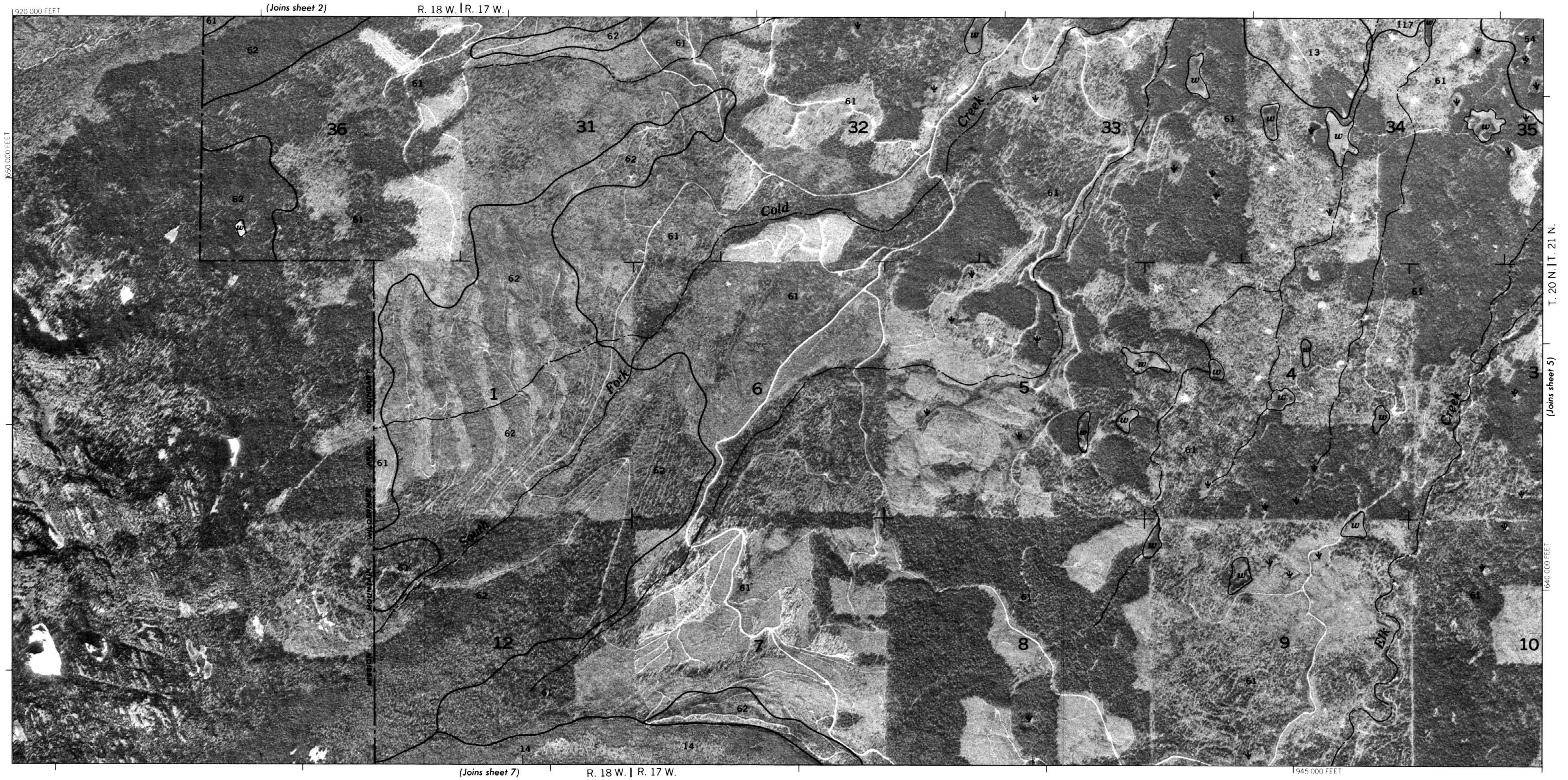
MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 4



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

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5

N

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MISSOULA COUNTY AREA, MONTANA NO. 5

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

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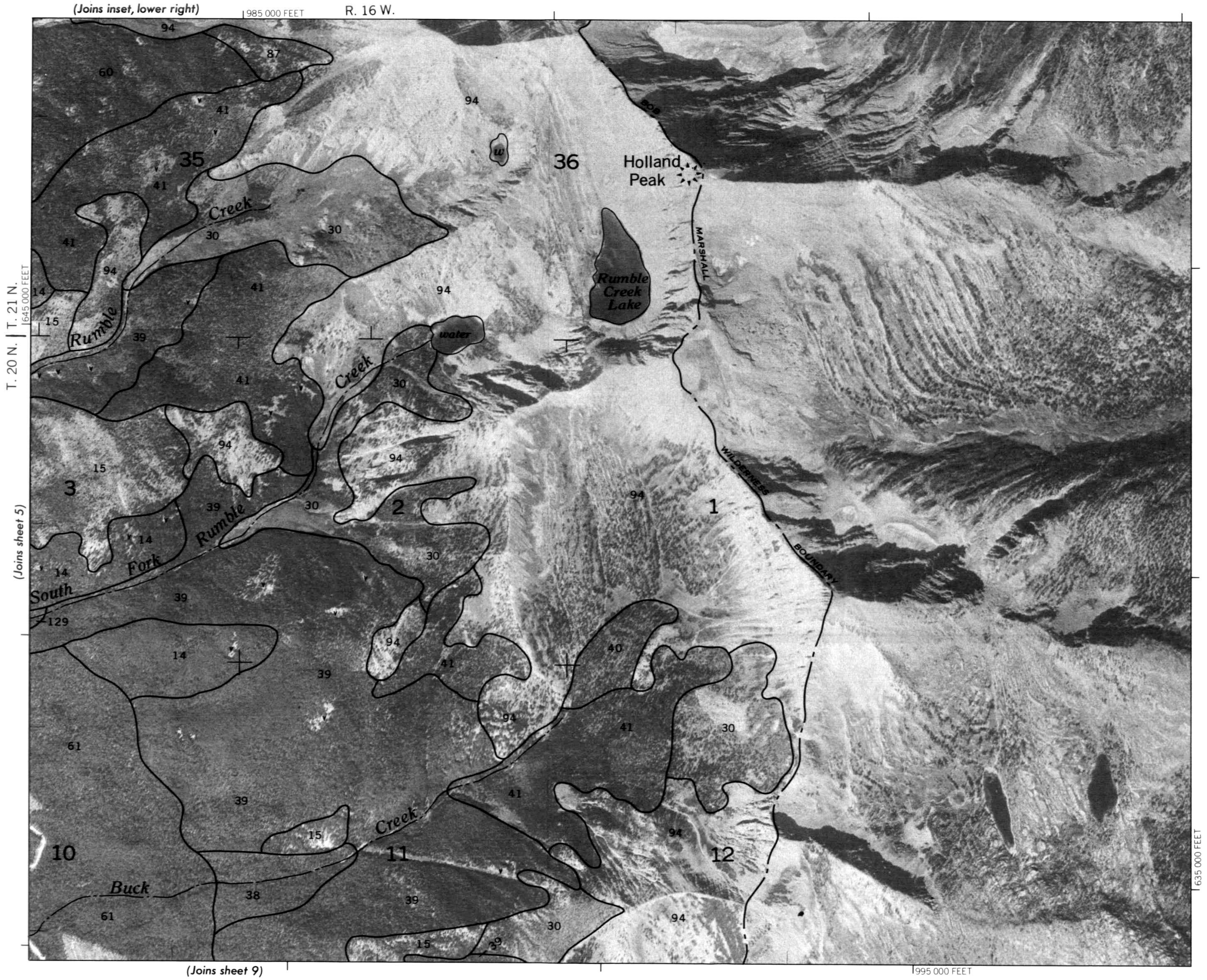

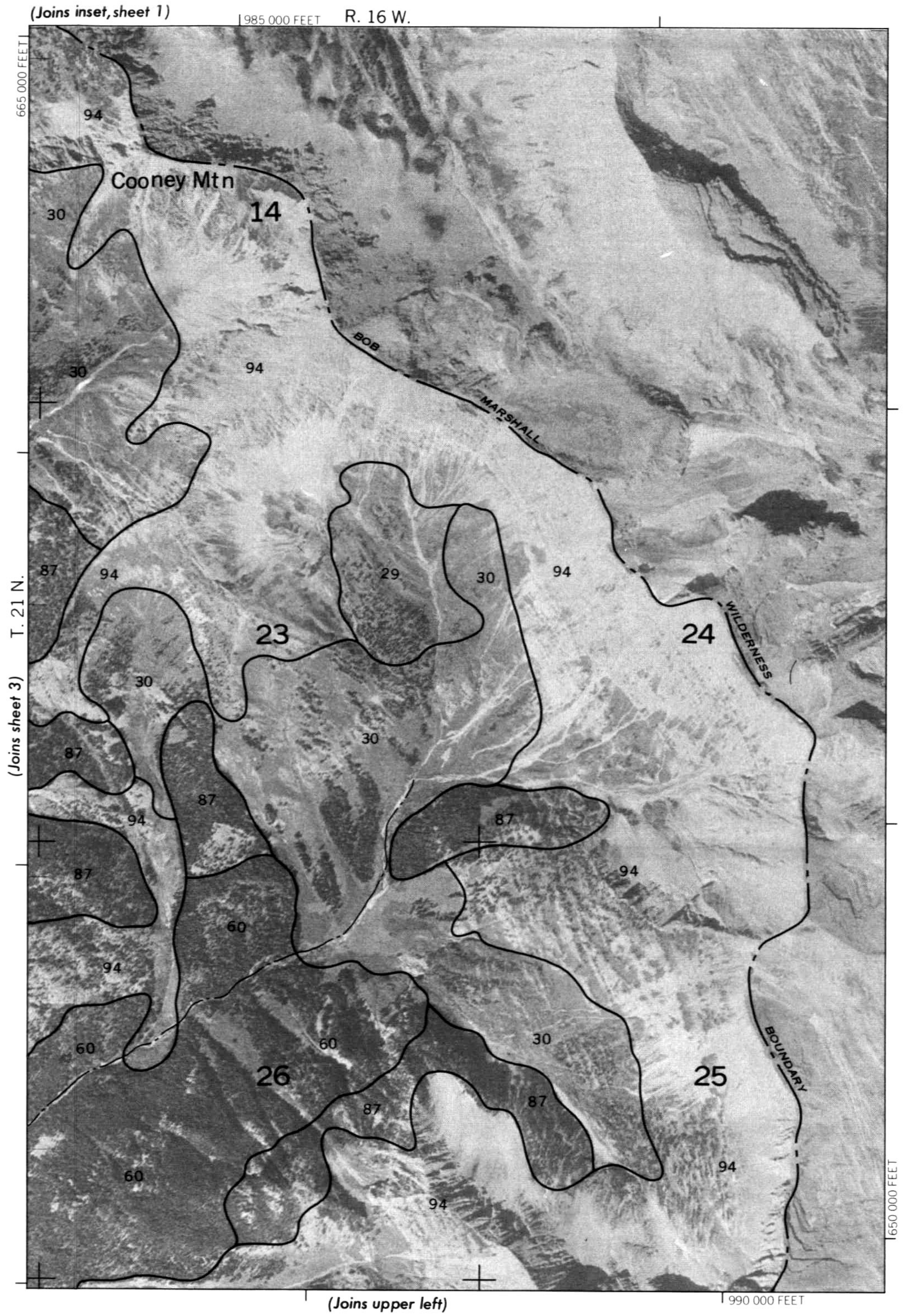

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 6

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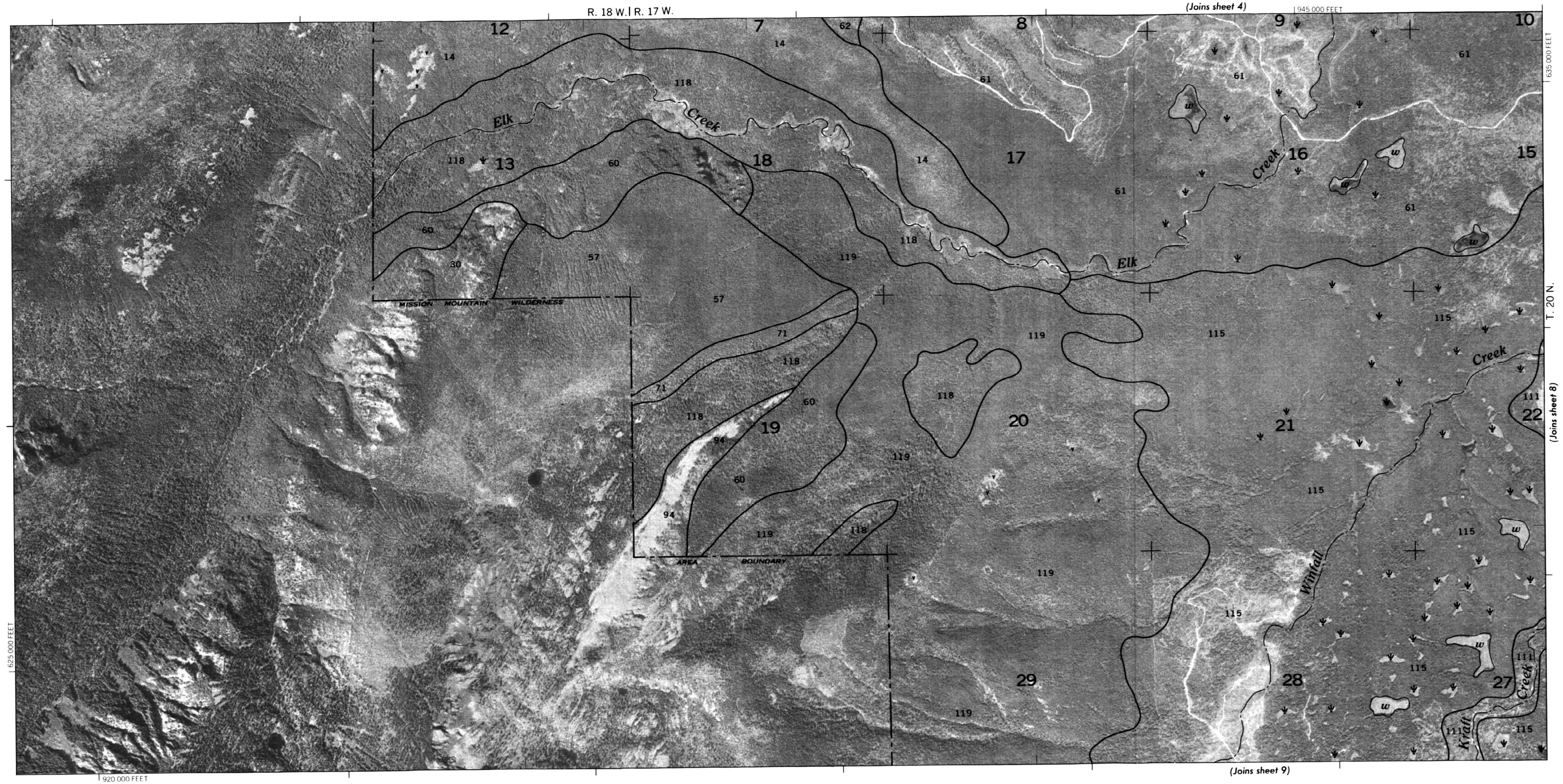
7

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 7



5000 4000 3000 2000 1000 0 5000 10000 Feet

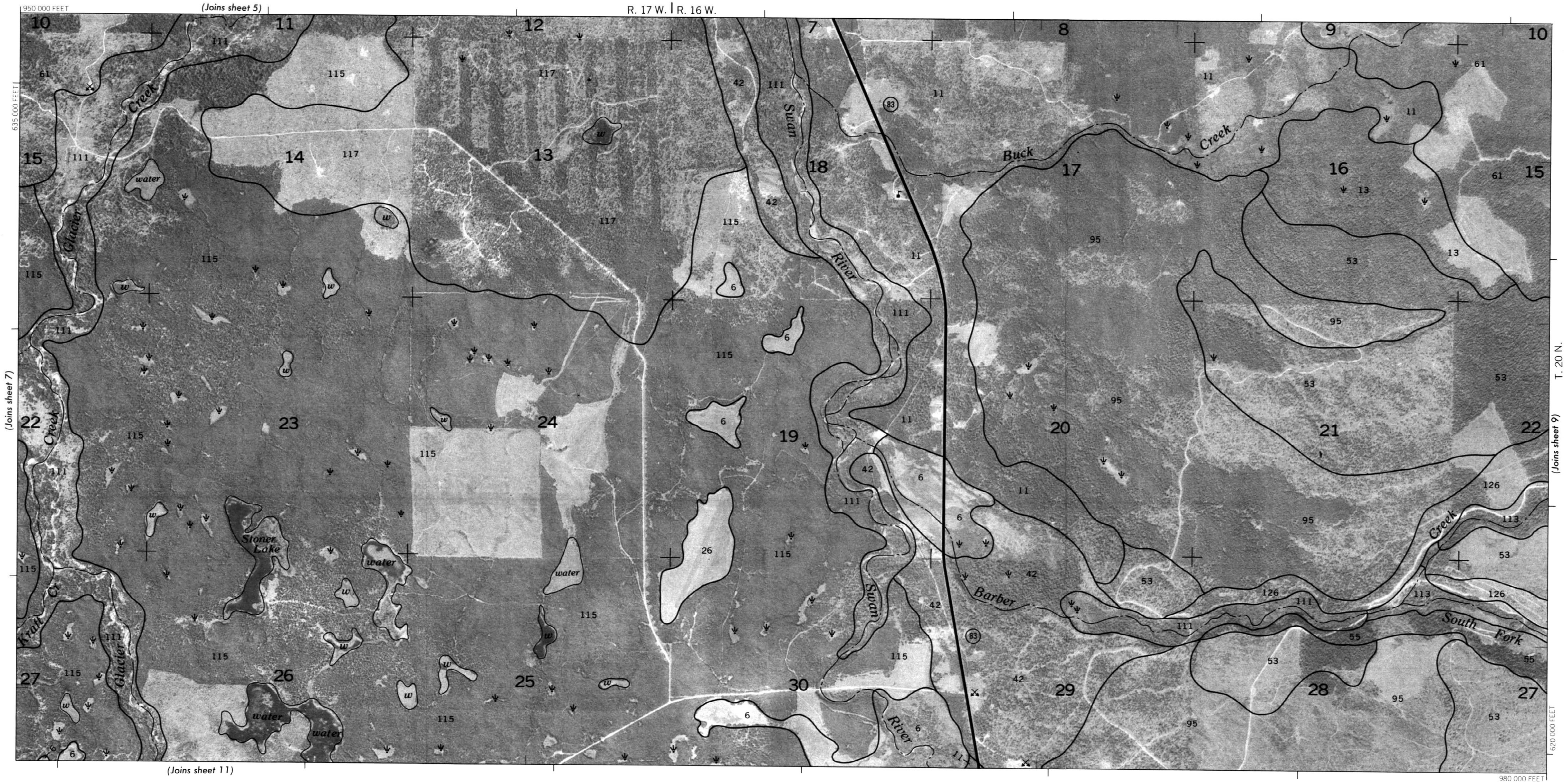
1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

8

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 8



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

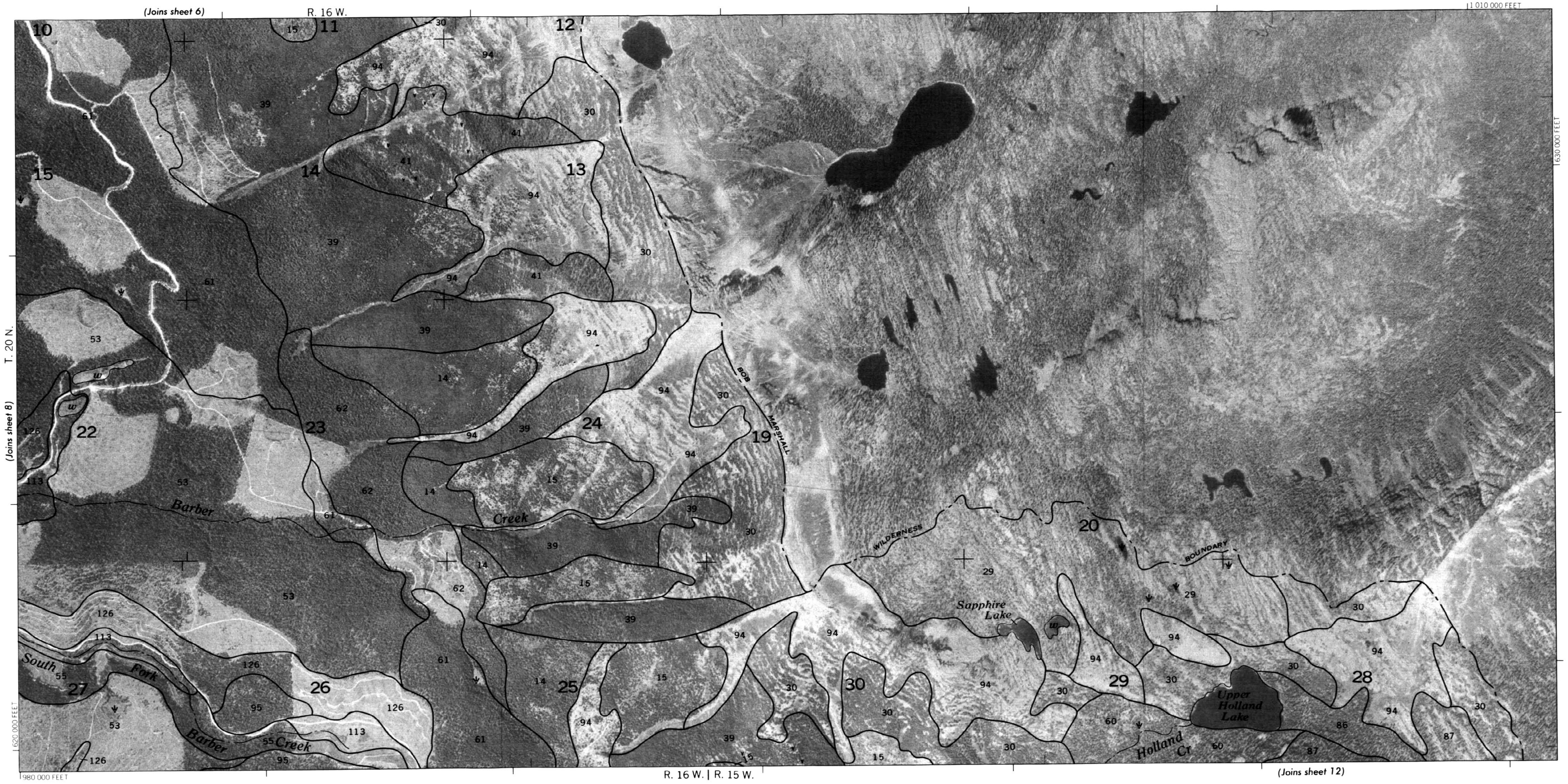
Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 8

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

9

N



Scale - 1:24000

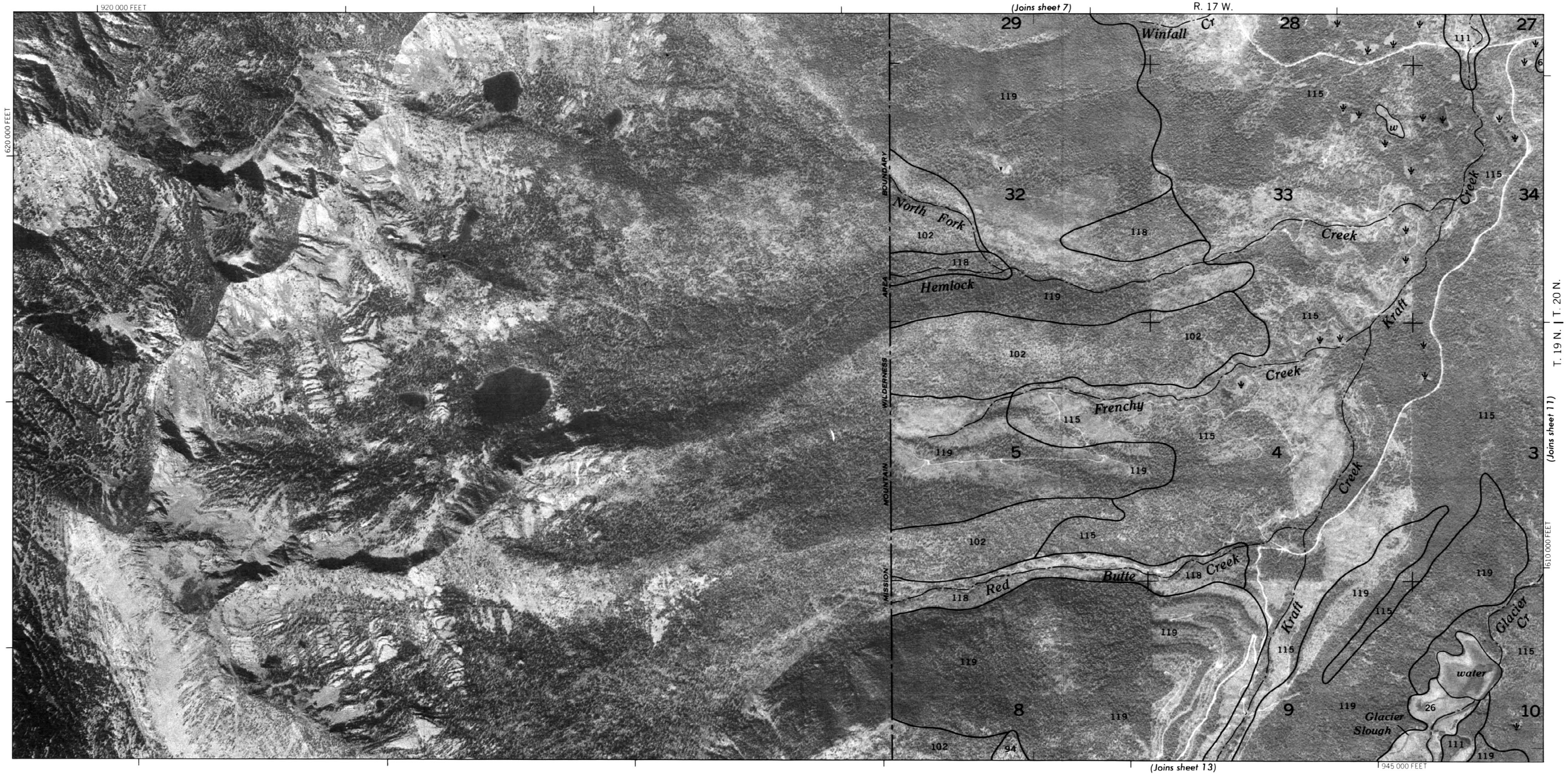
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 10



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 10

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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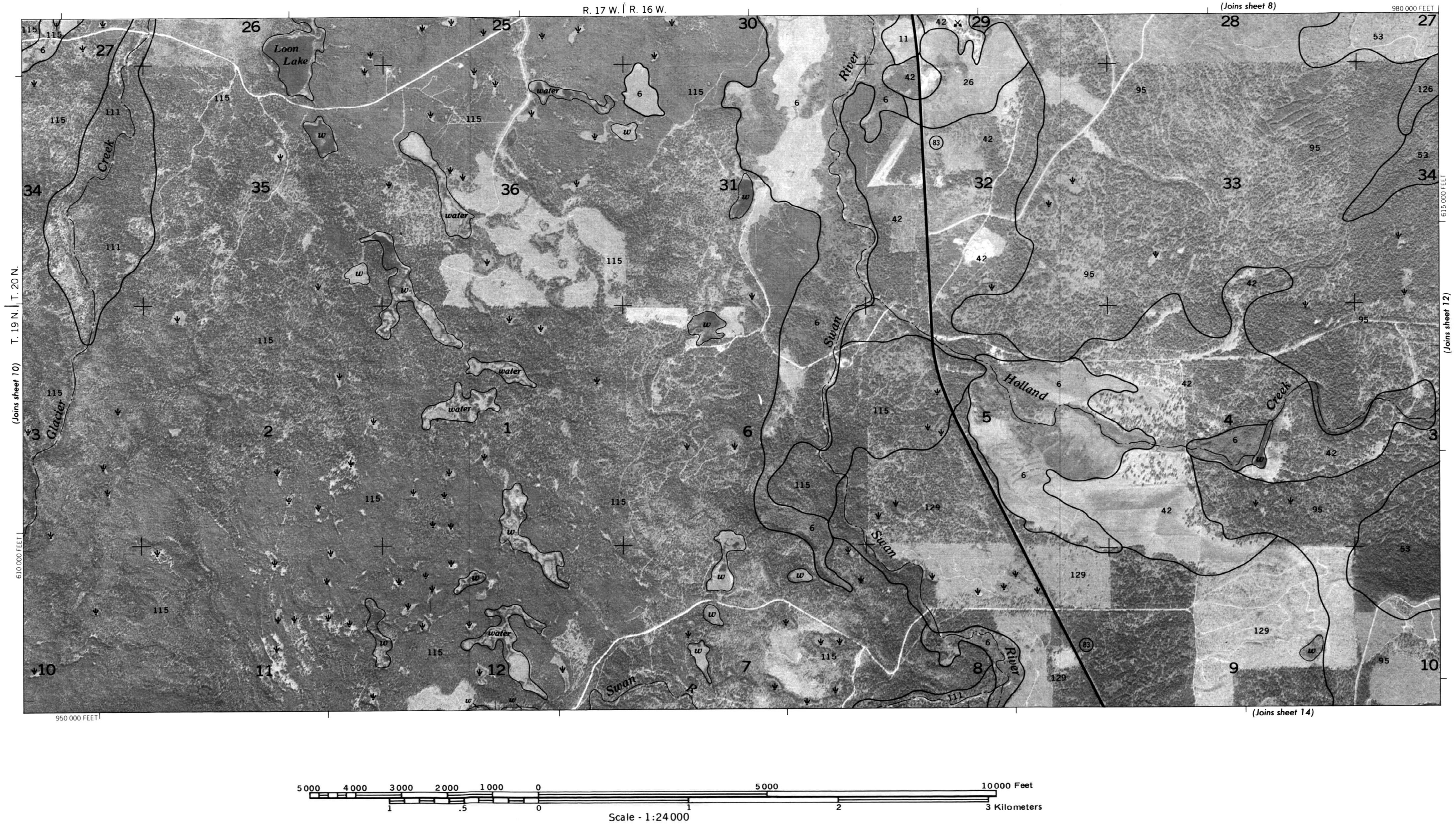
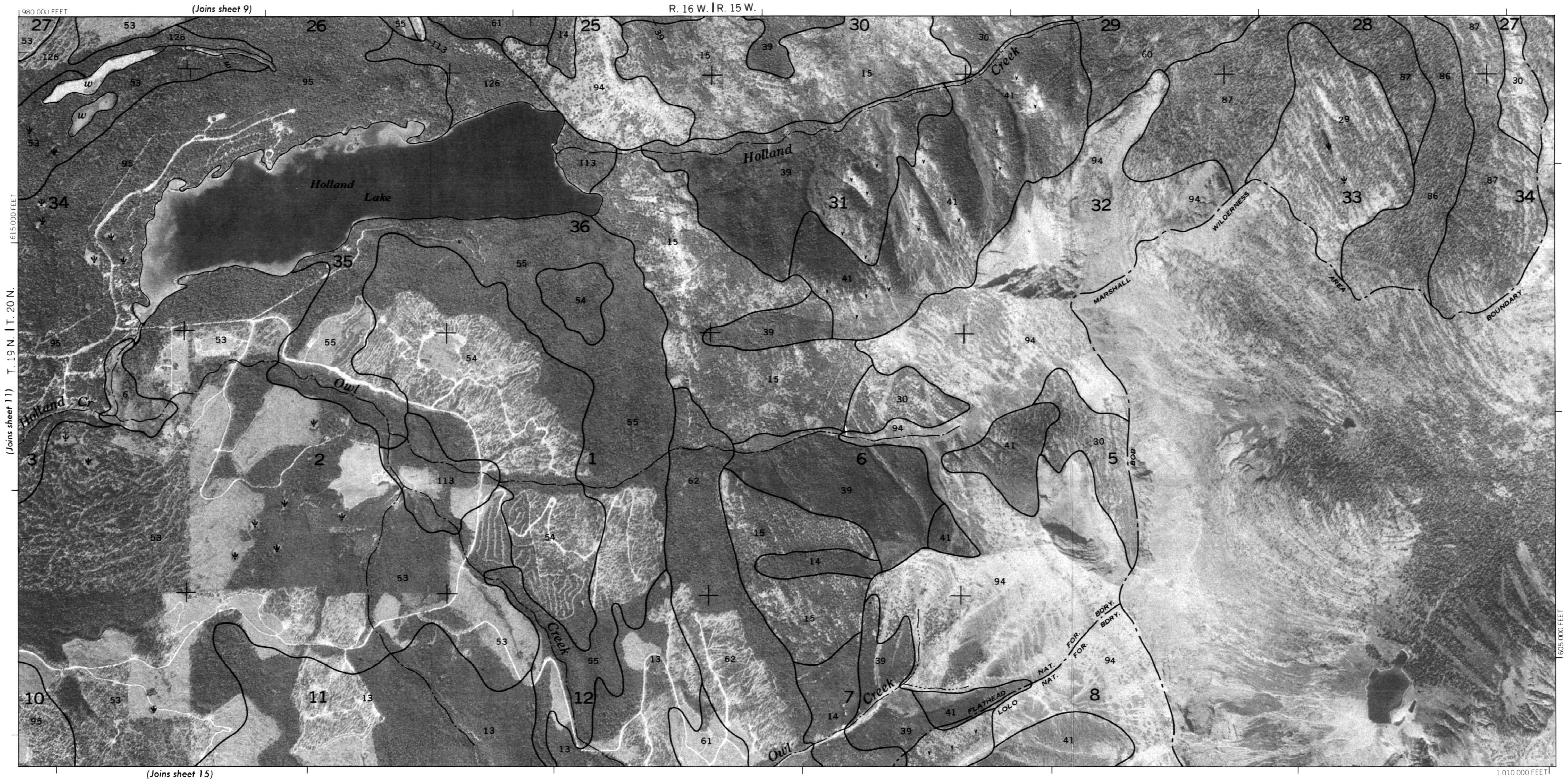
MISSOULA COUNTY AREA, MONTANA NO. 11



N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 12



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 12

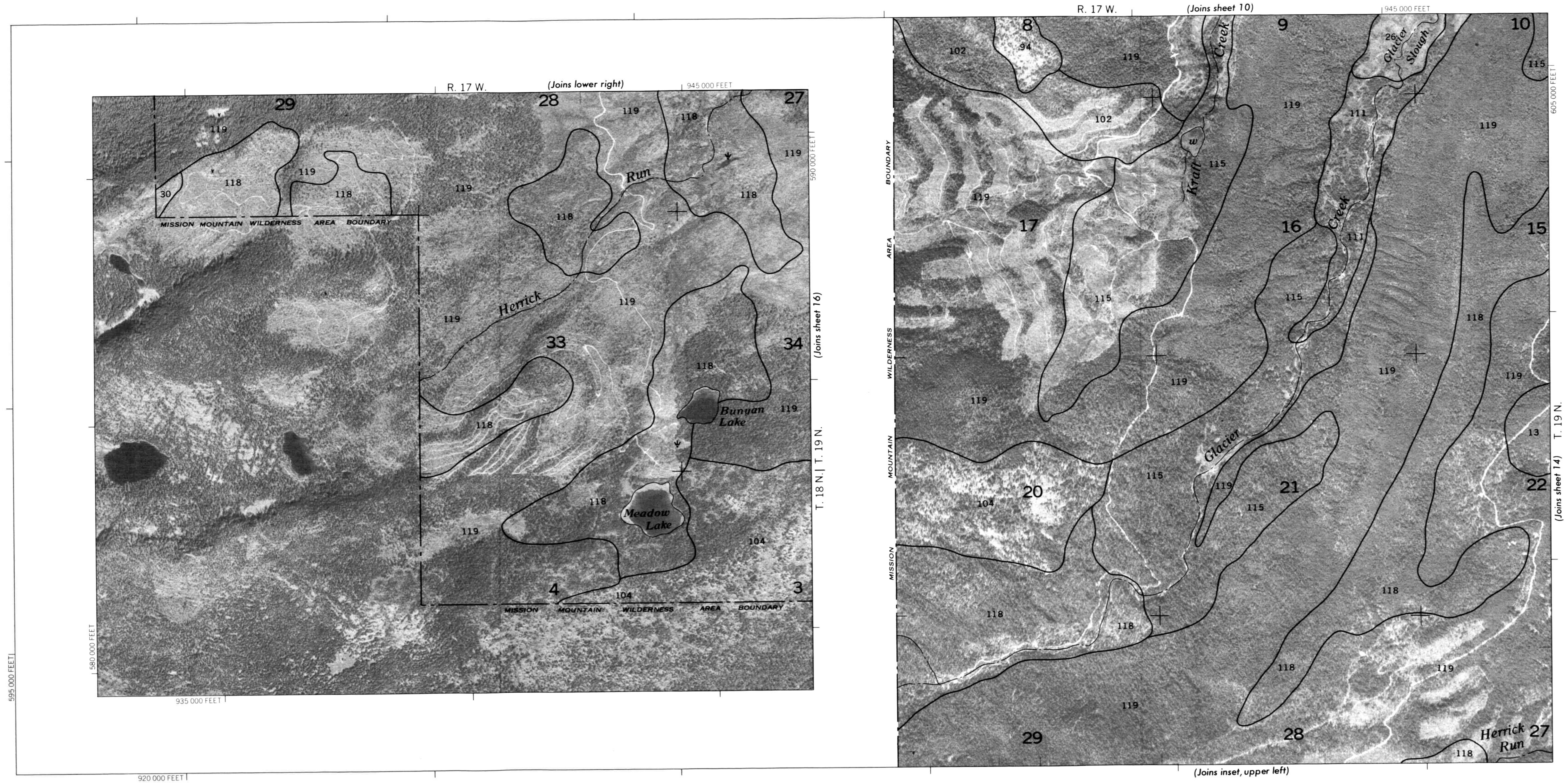
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

13

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 13



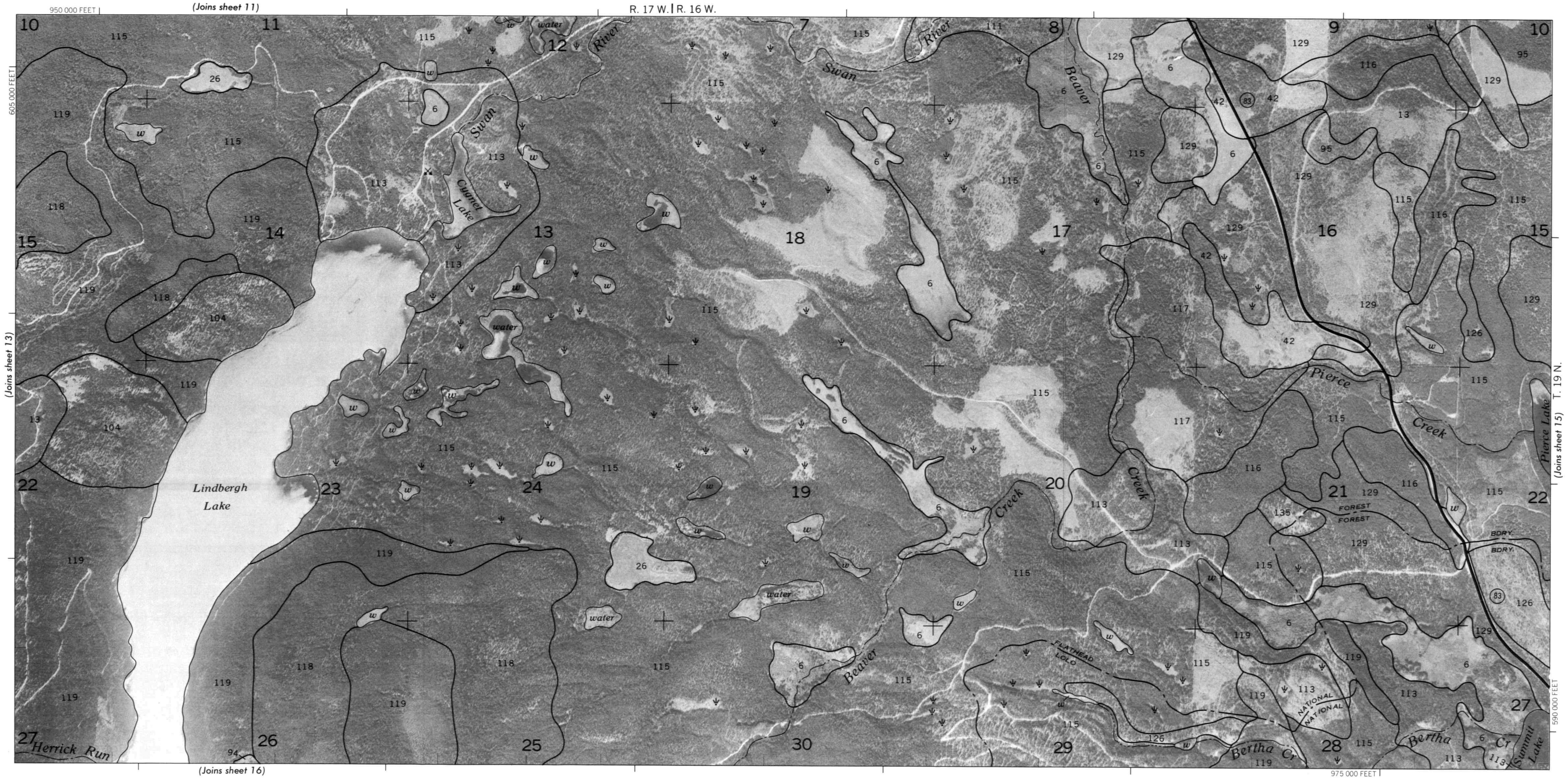
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 14



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 14

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(15)
N

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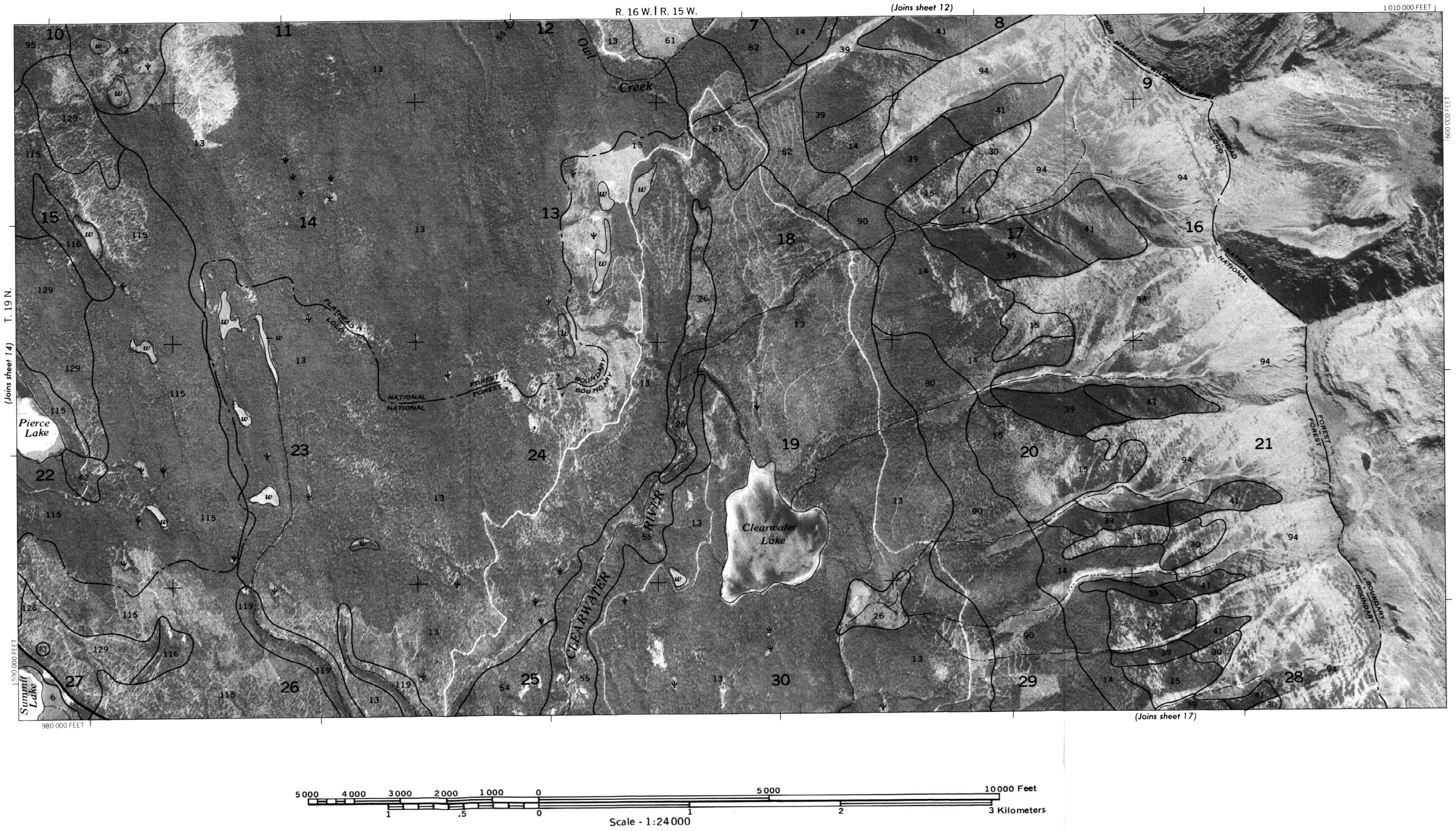
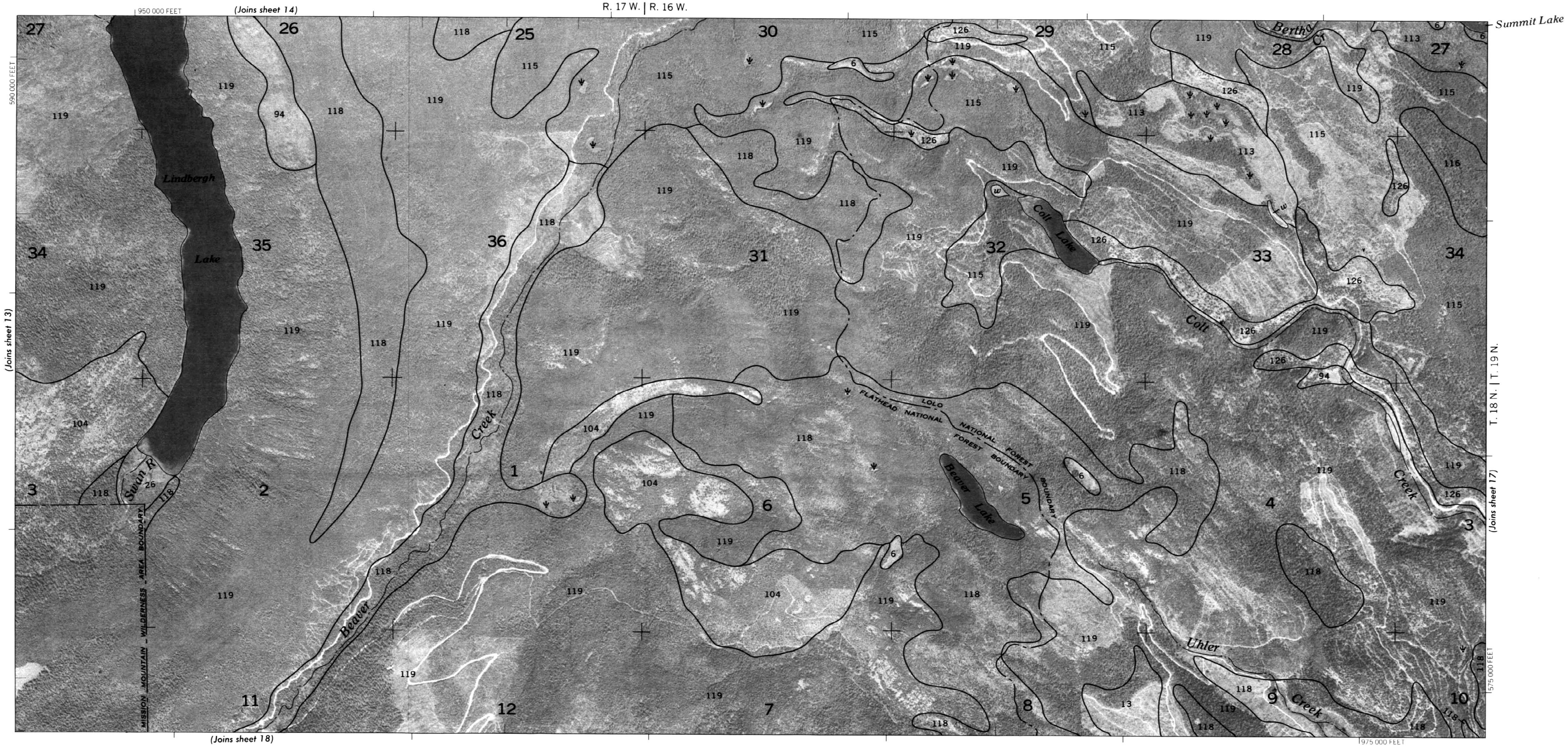
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 15



N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 16



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 16

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 17

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

18

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

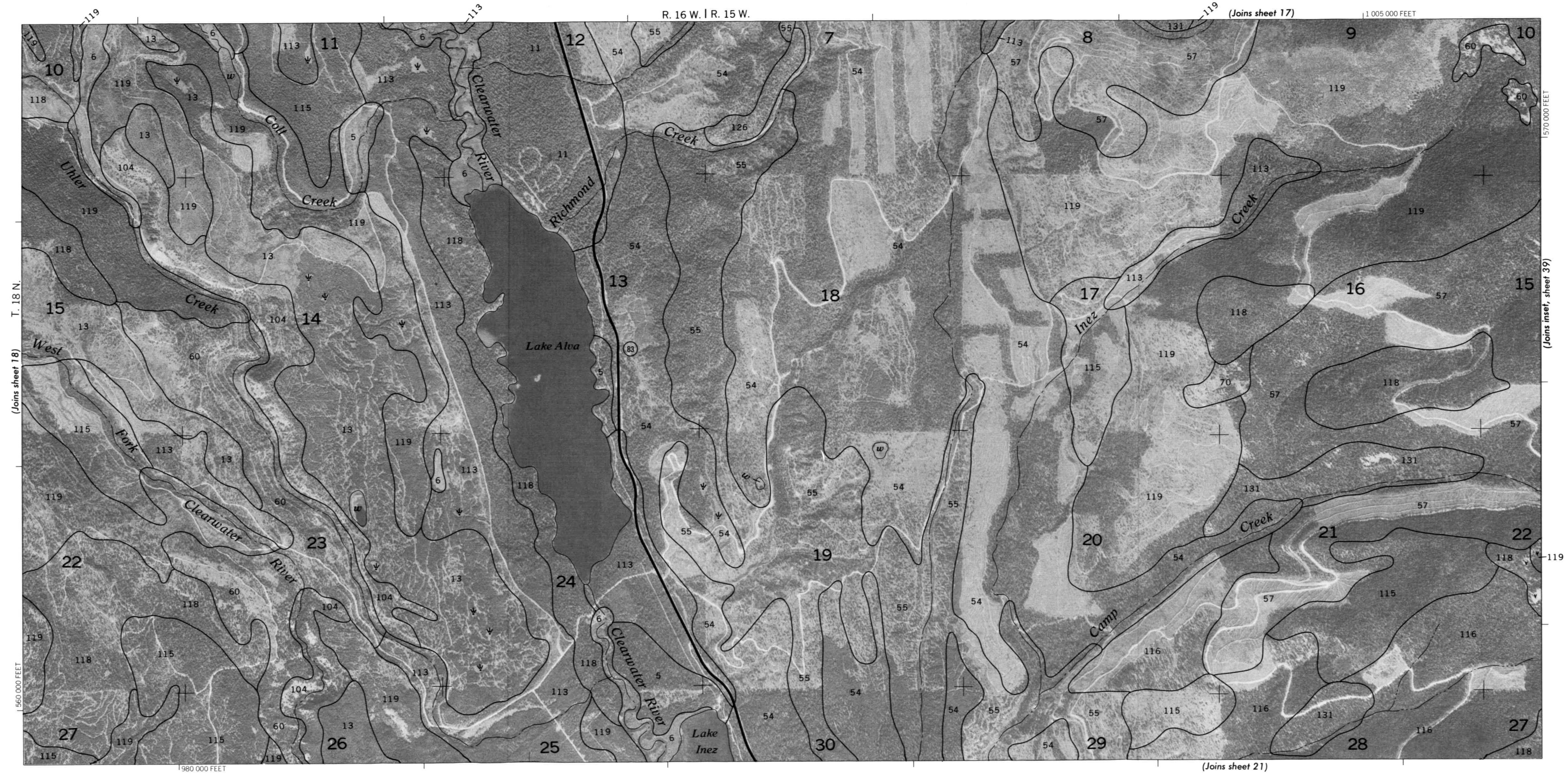
MISSOULA COUNTY AREA, MONTANA NO. 18

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 19



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 20

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 20

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

21

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 21

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 22

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

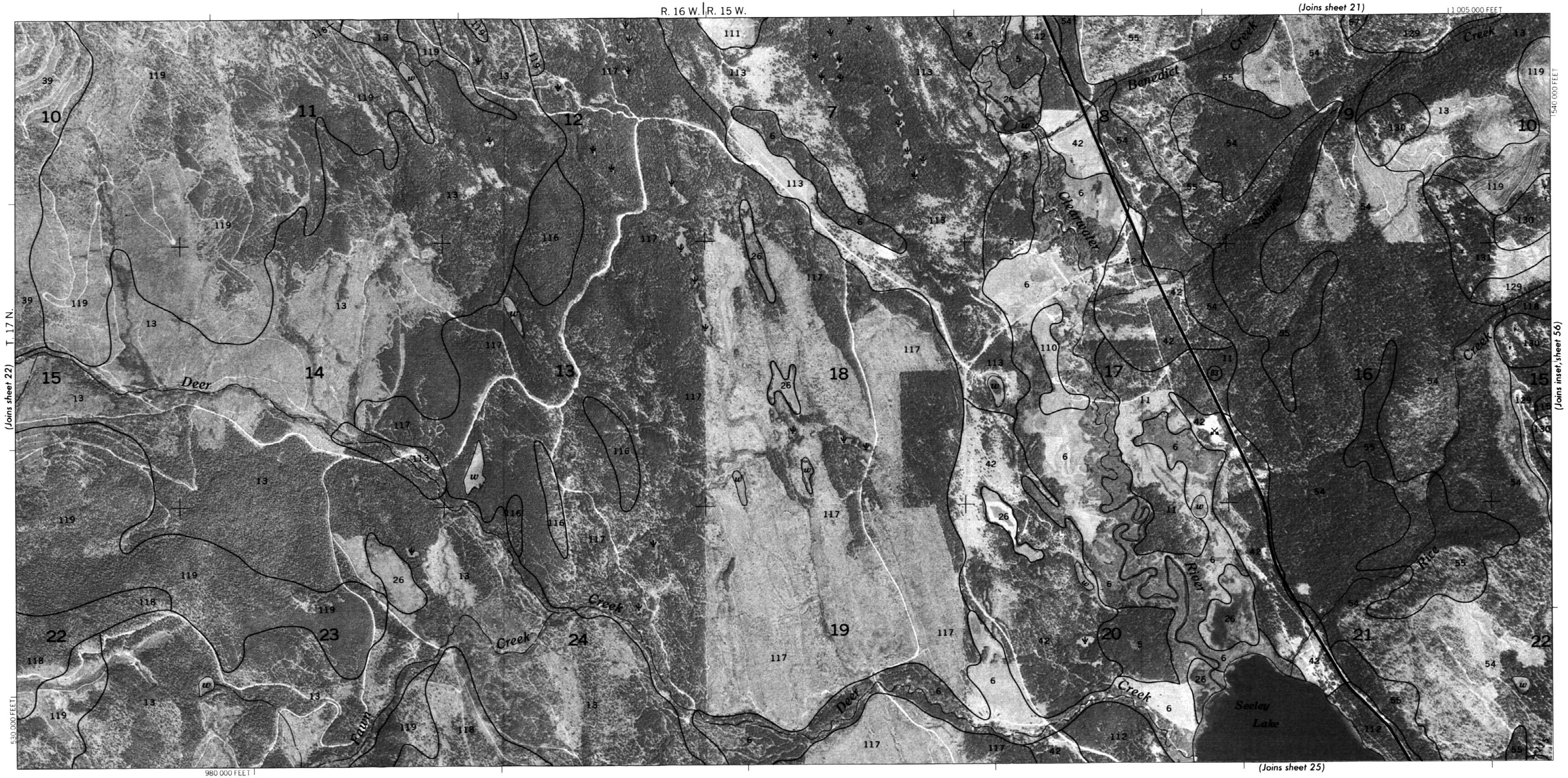
Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 22

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

23

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

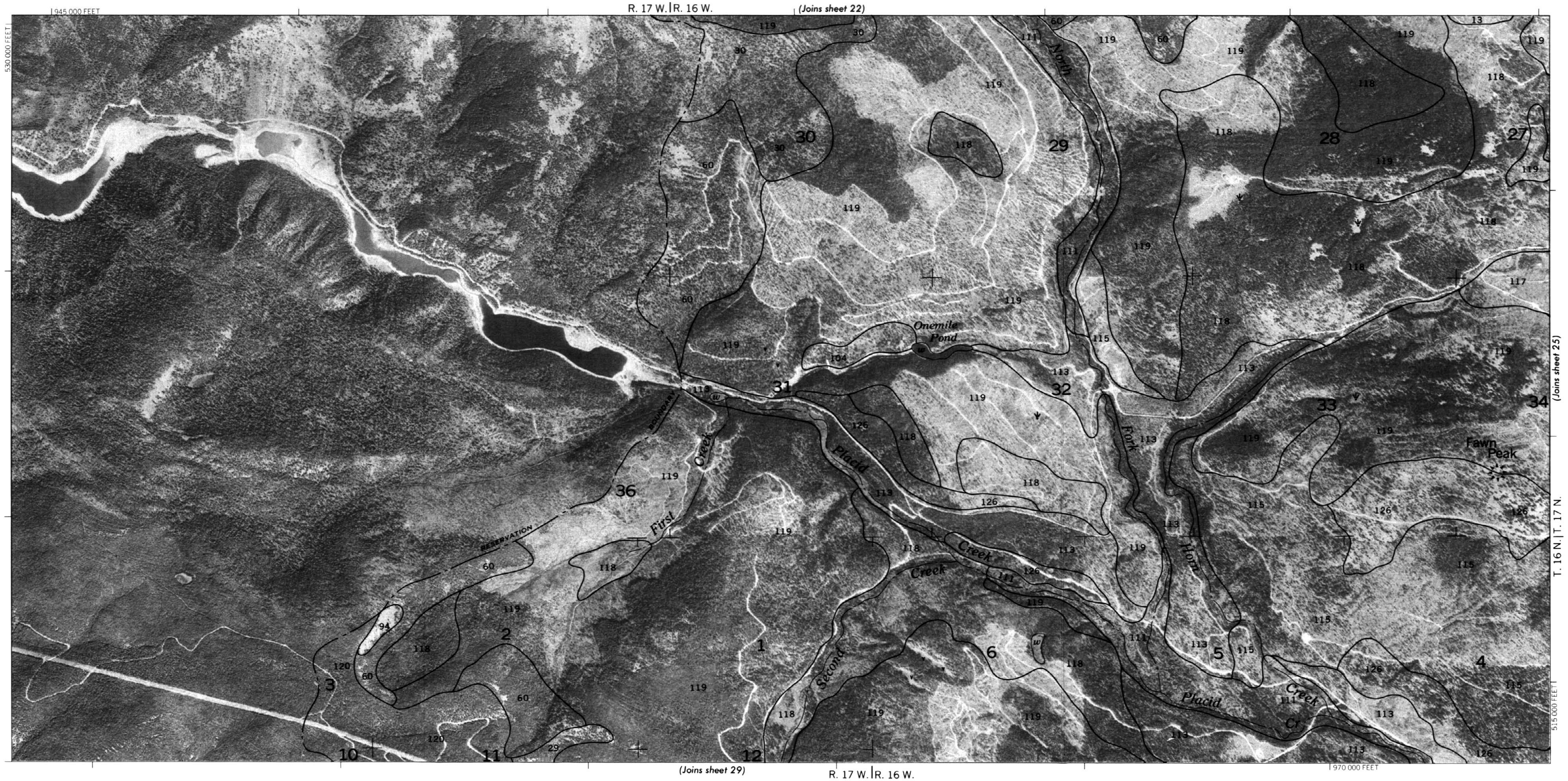
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 24



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 24

25

N

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Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 25

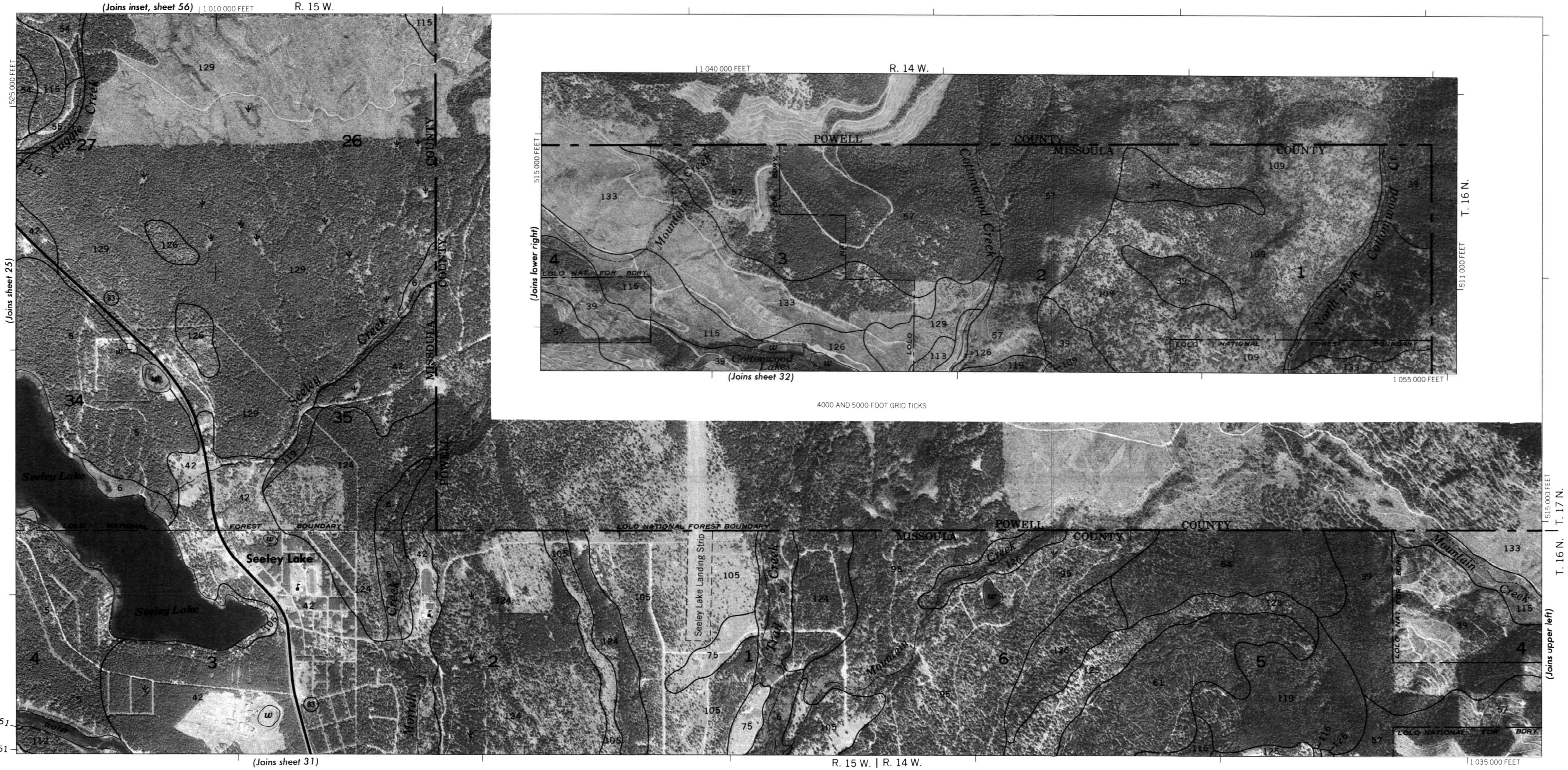
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 26



5000 4000 3000 2000 1000 0 5000 10000 Feet

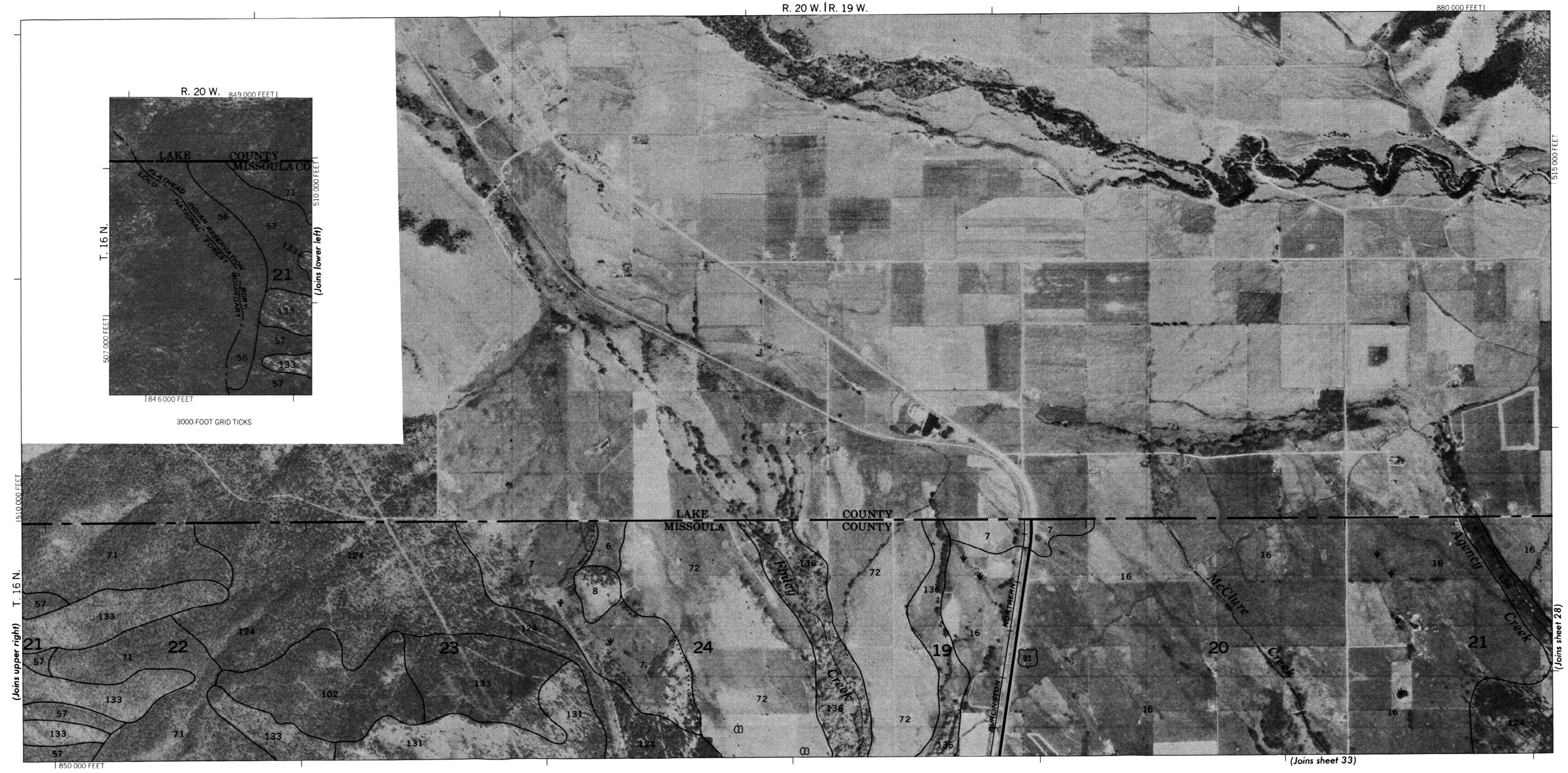
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 27



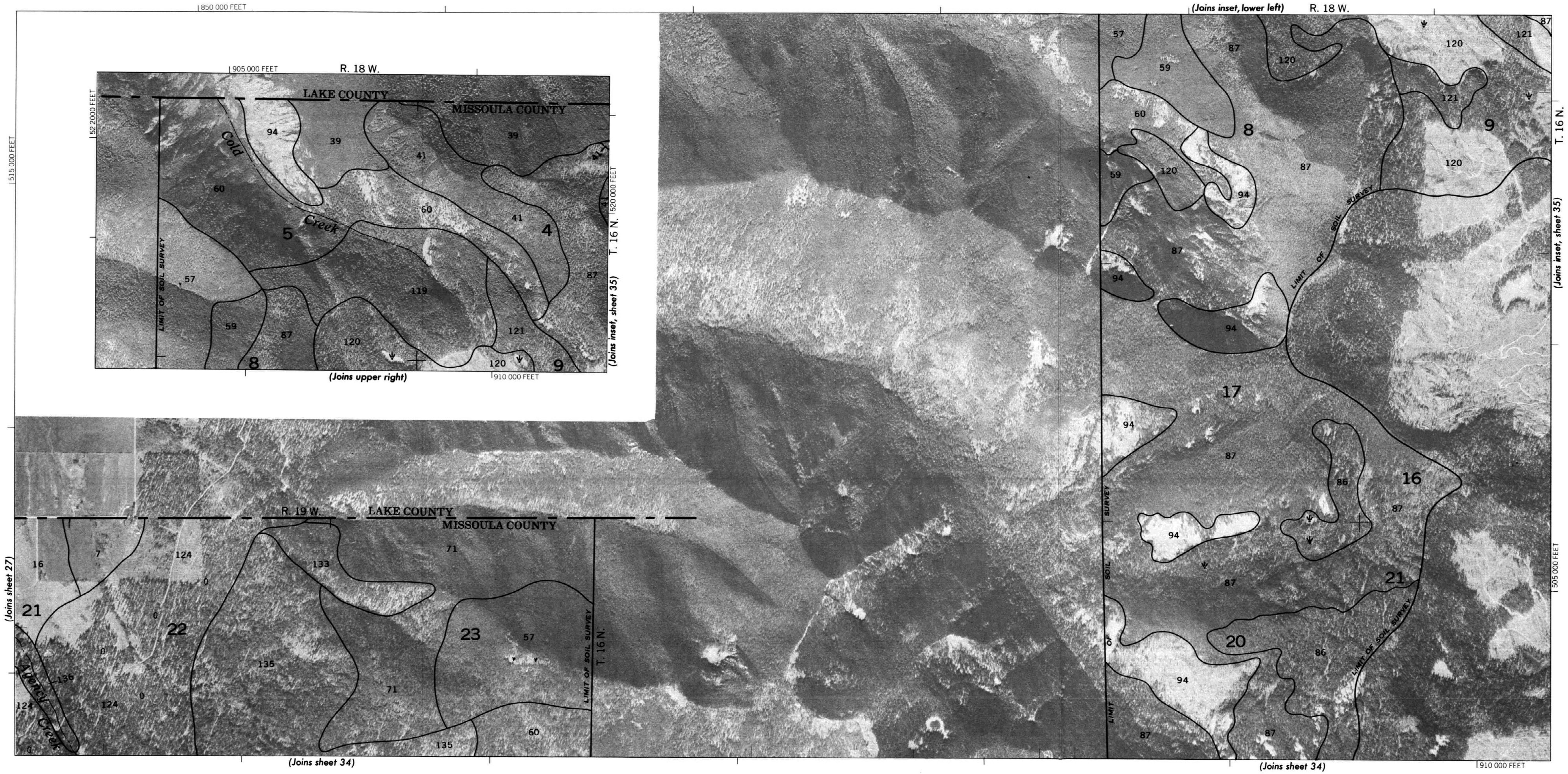
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 28



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 28

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(29)

N

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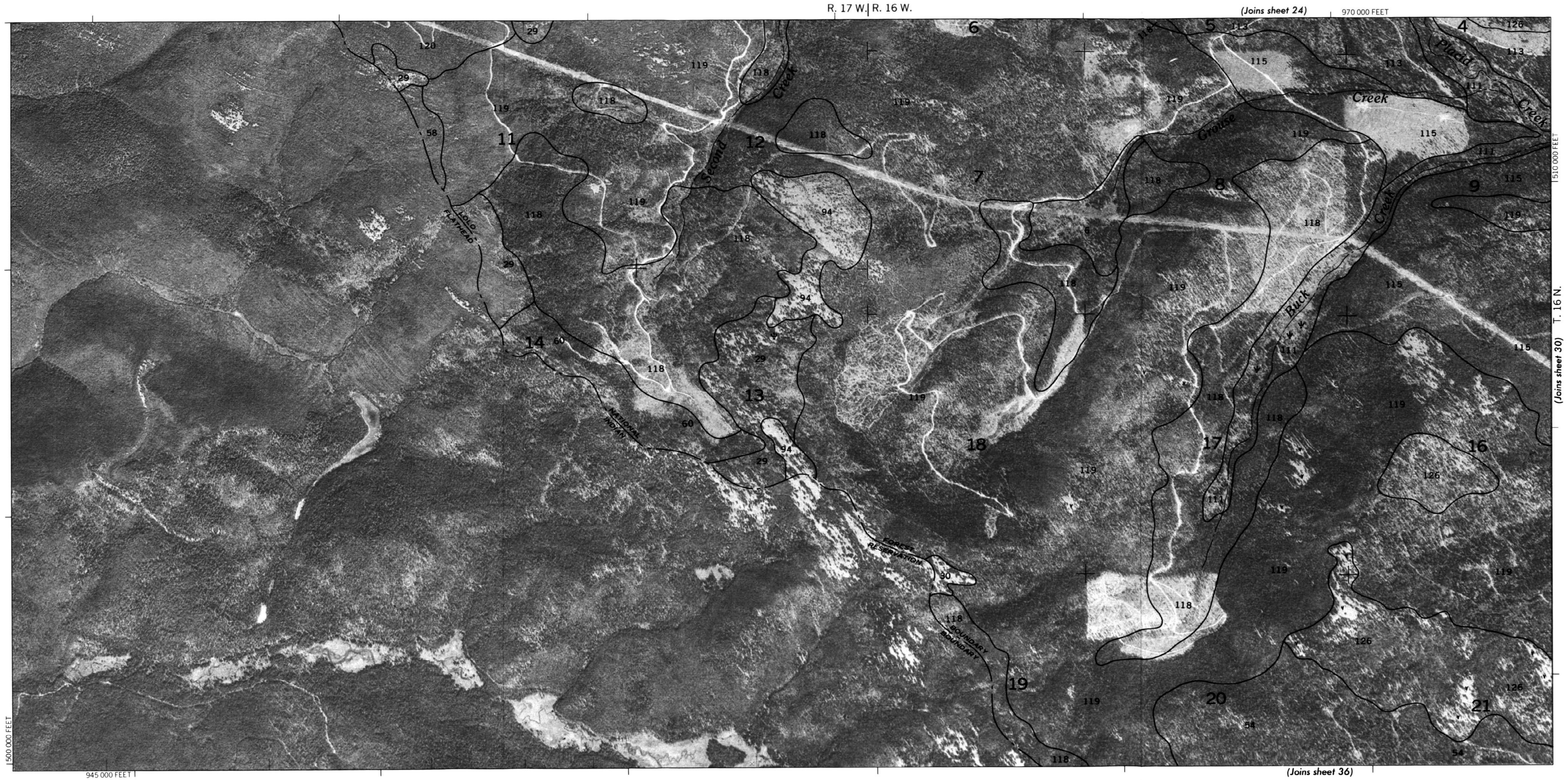
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial
photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 29



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 30

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 30

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

31

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 31

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 32

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 32

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

33

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 33

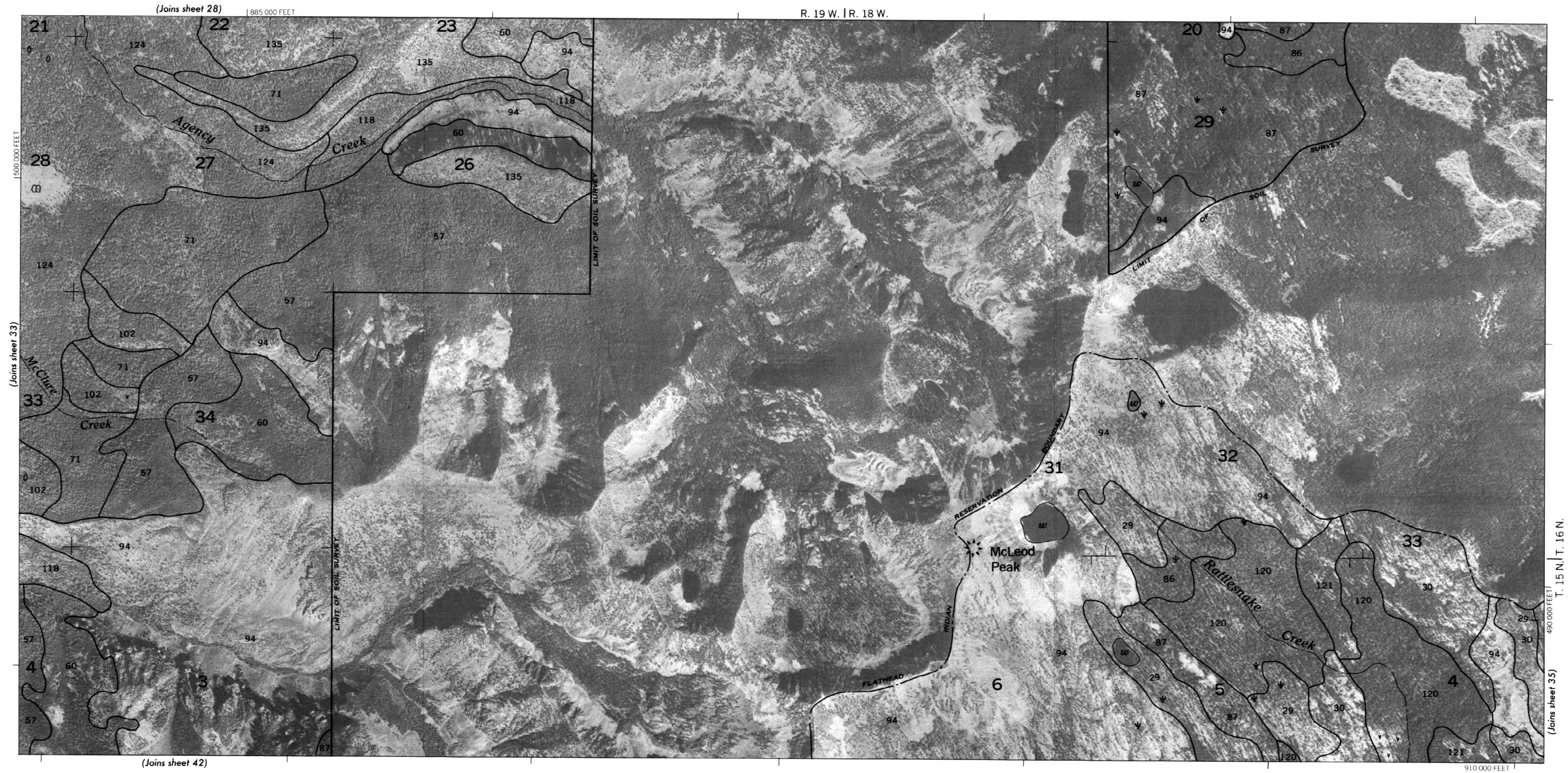
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

34

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 34



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 34

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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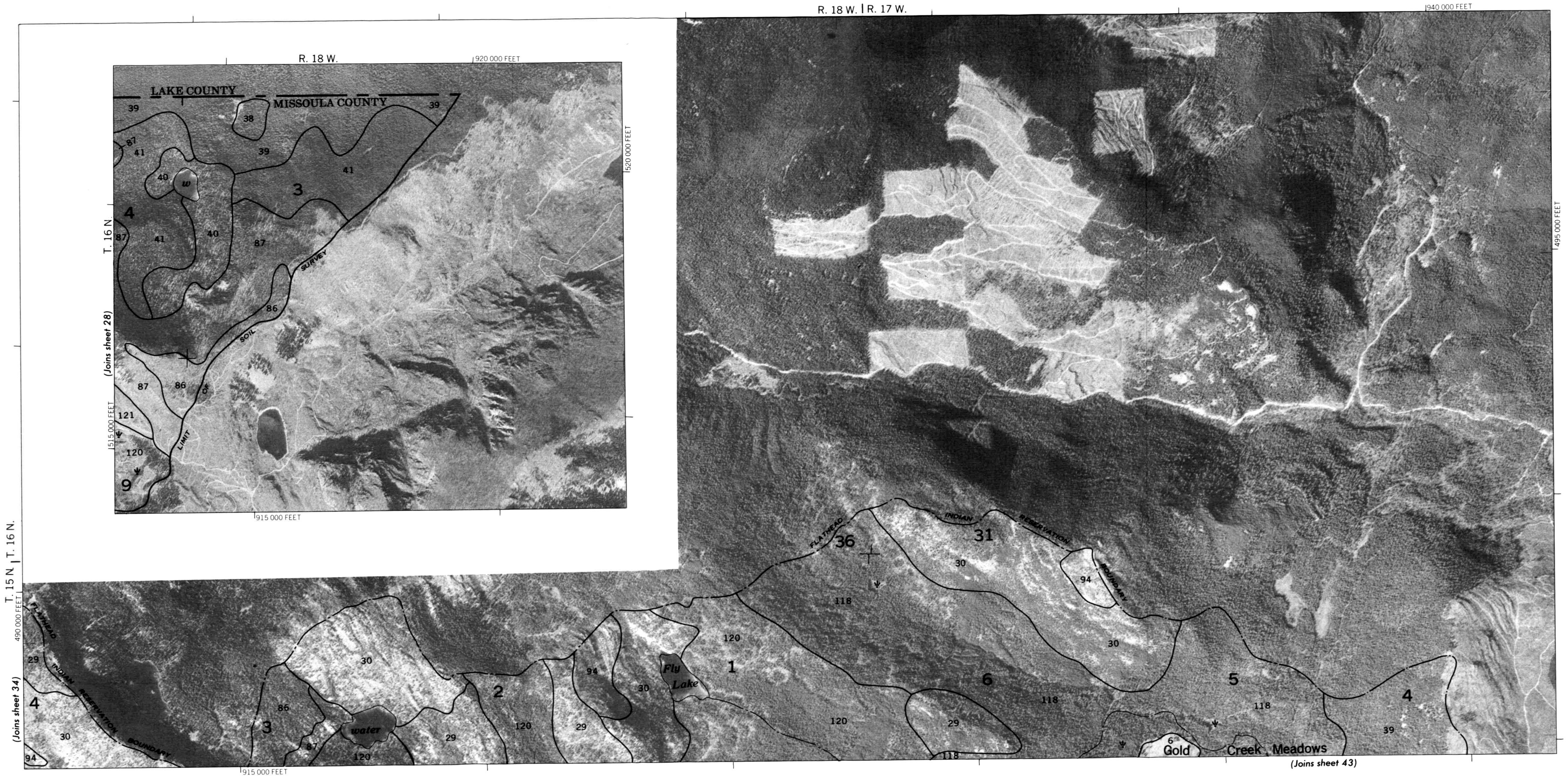
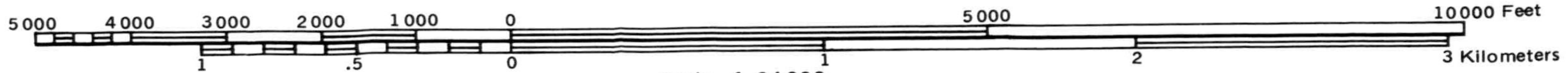
MISSOULA COUNTY AREA, MONTANA NO. 35





Scale - 1:24 000

N

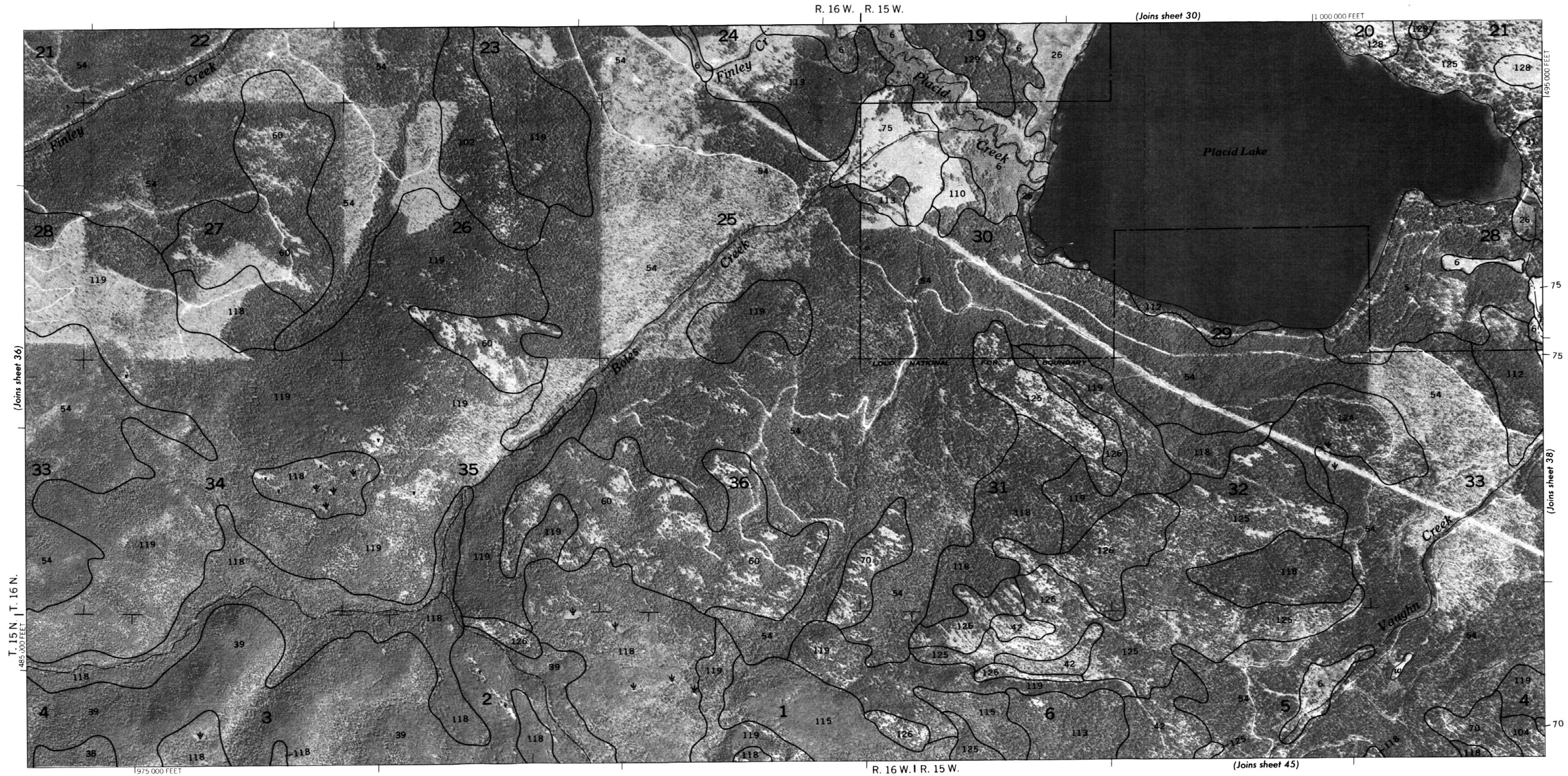
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

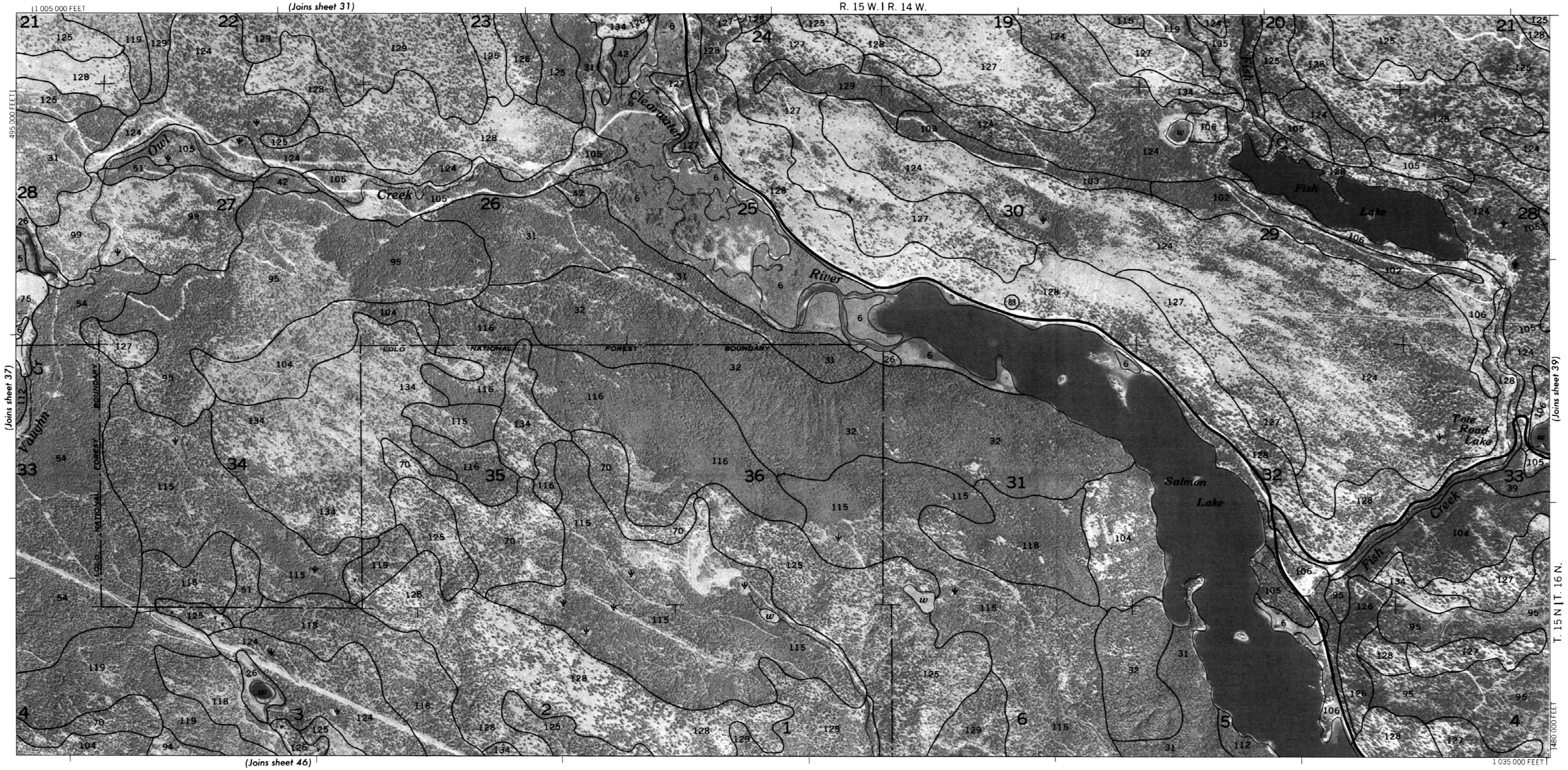
1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 38

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 38

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

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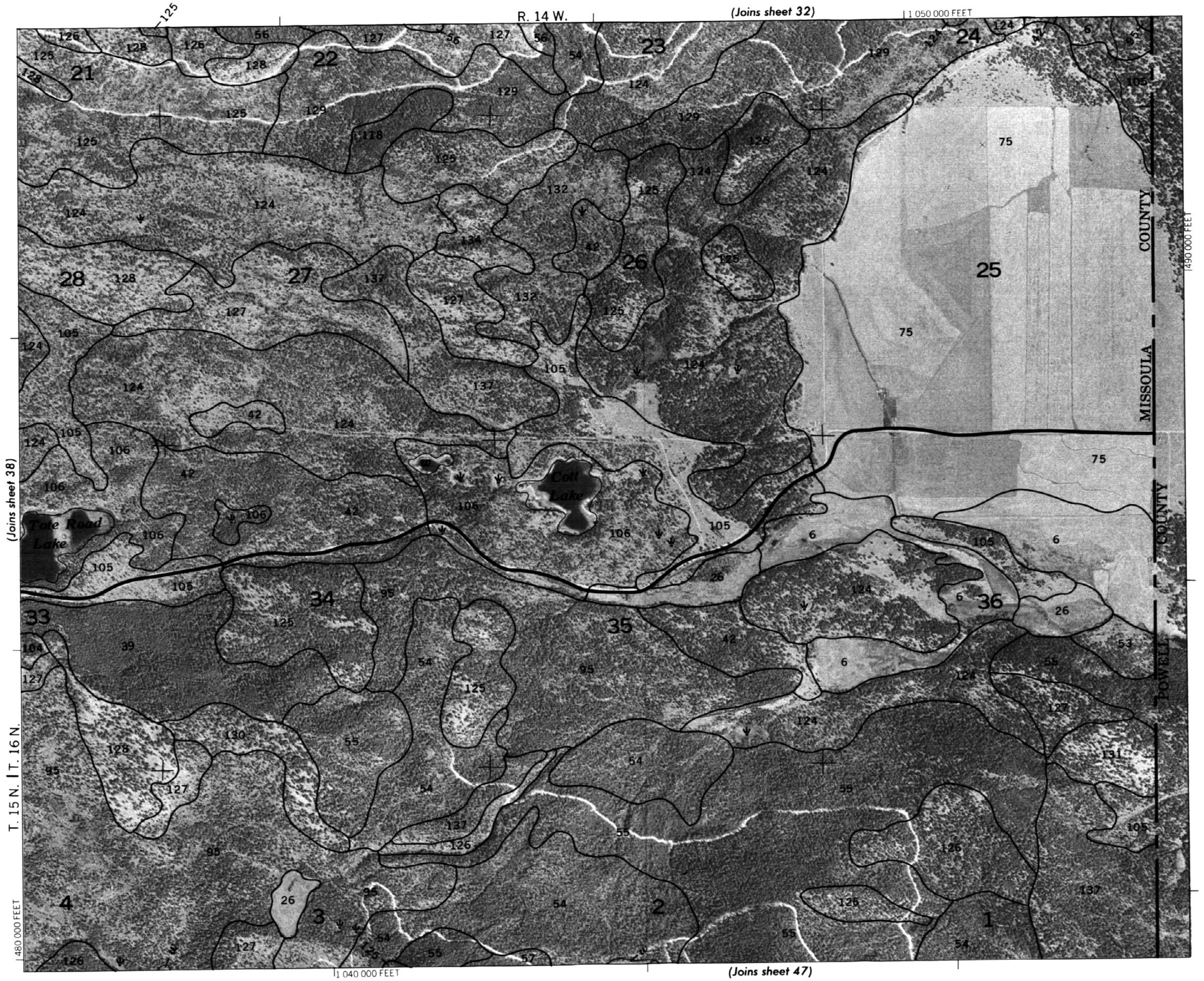
MISSOULA COUNTY AREA, MONTANA NO. 39



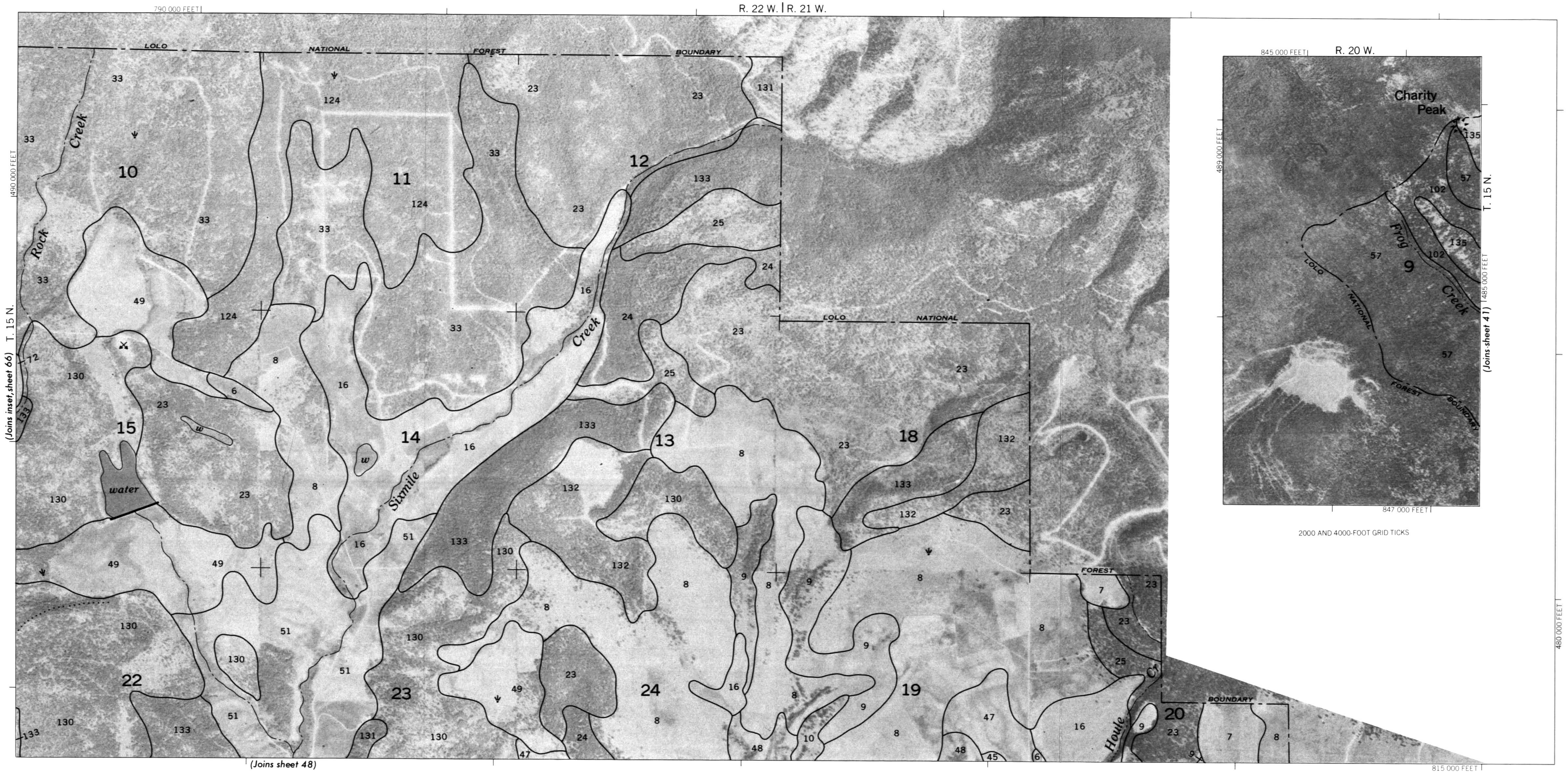
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 40



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 40

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

41

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 41

Scale - 1:24000

42

N

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

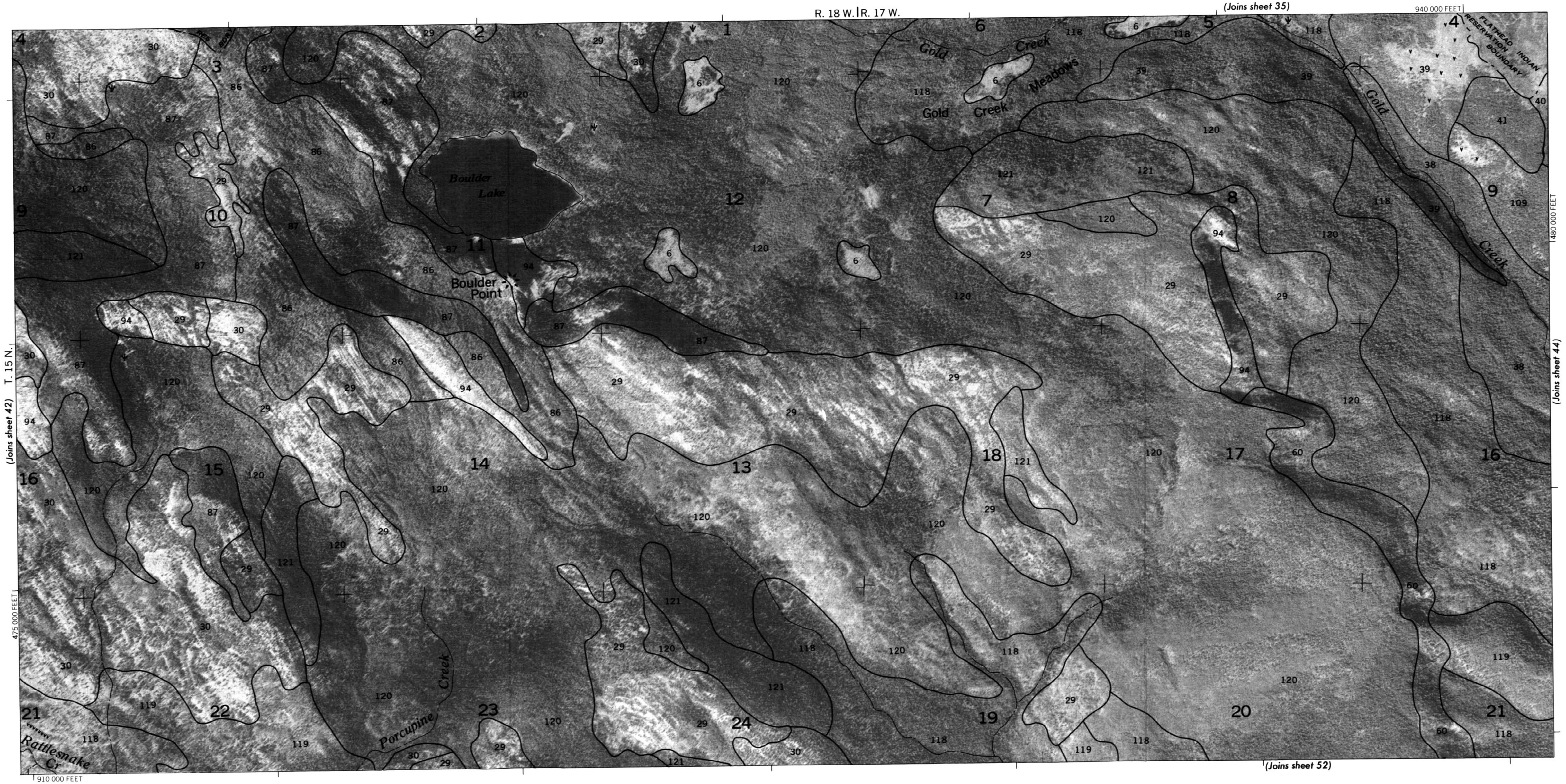
MISSOULA COUNTY AREA, MONTANA NO. 42

43

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial
photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 43



5000 4000 3000 2000 1000 0 5000 10000 Feet

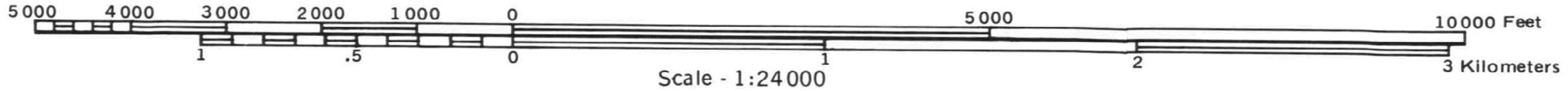
1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

44

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 44



Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 44

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

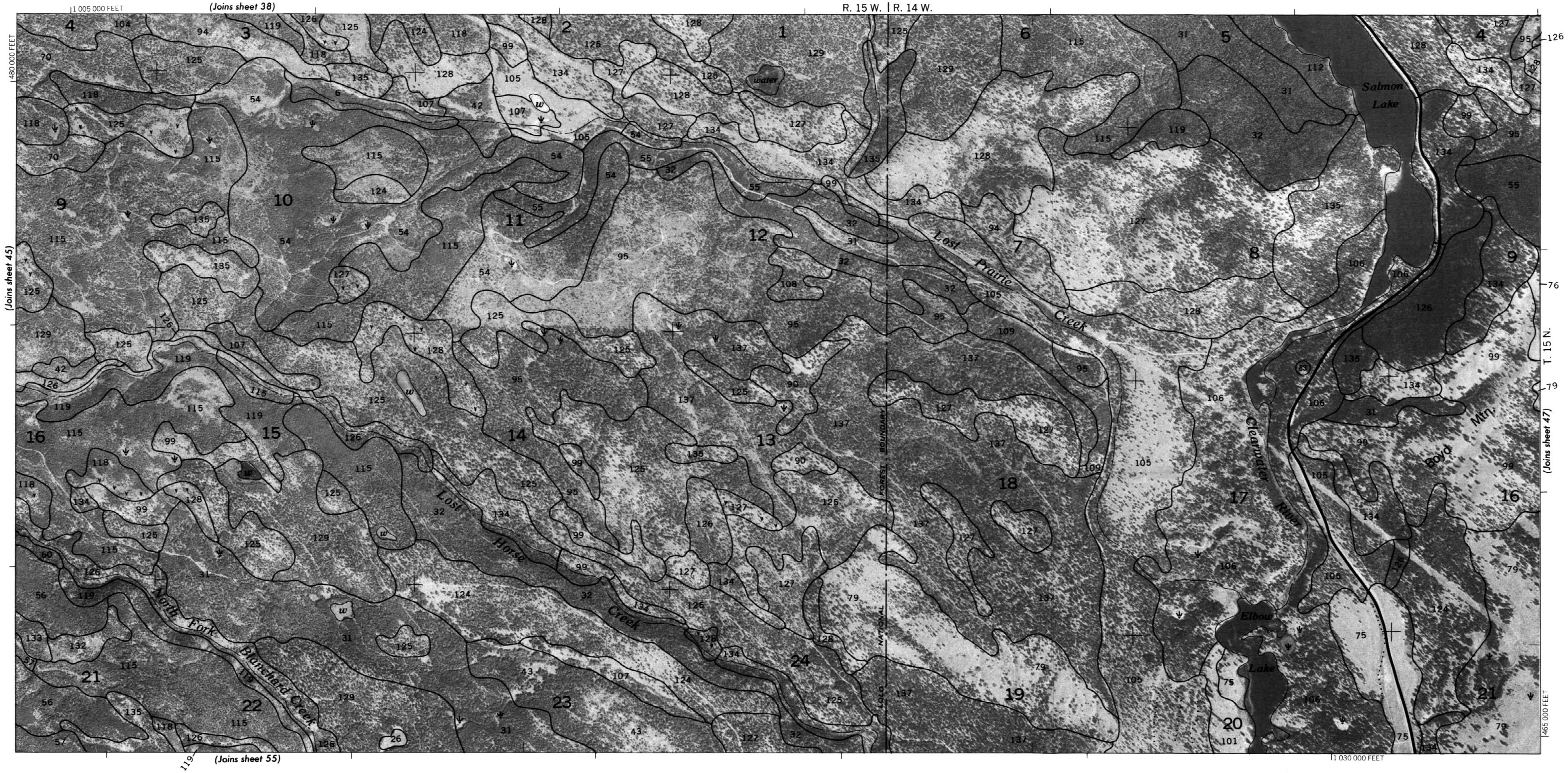
Scale - 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 45

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 46



5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

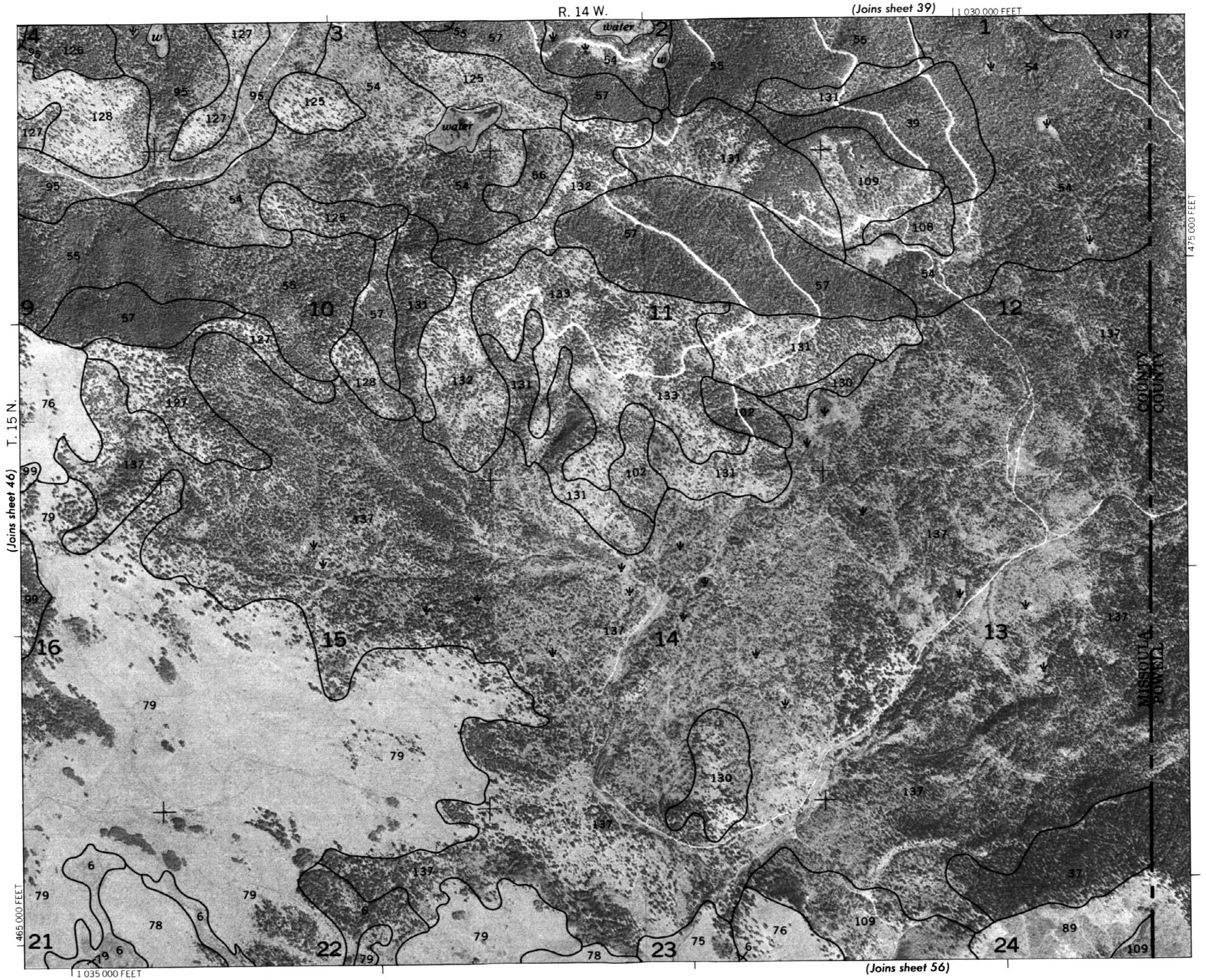
MISSOULA COUNTY AREA, MONTANA NO. 46

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 47



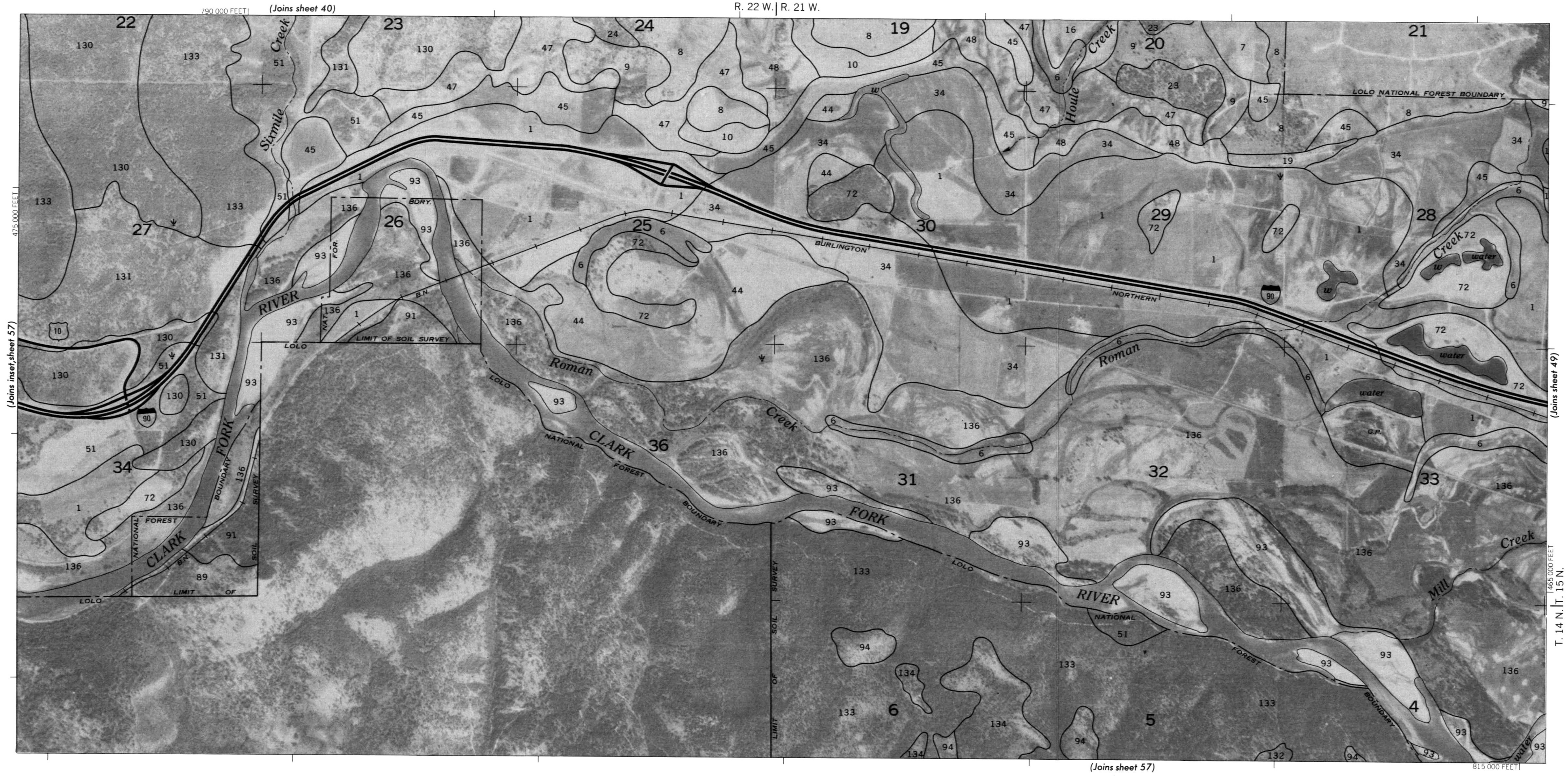
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 48

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

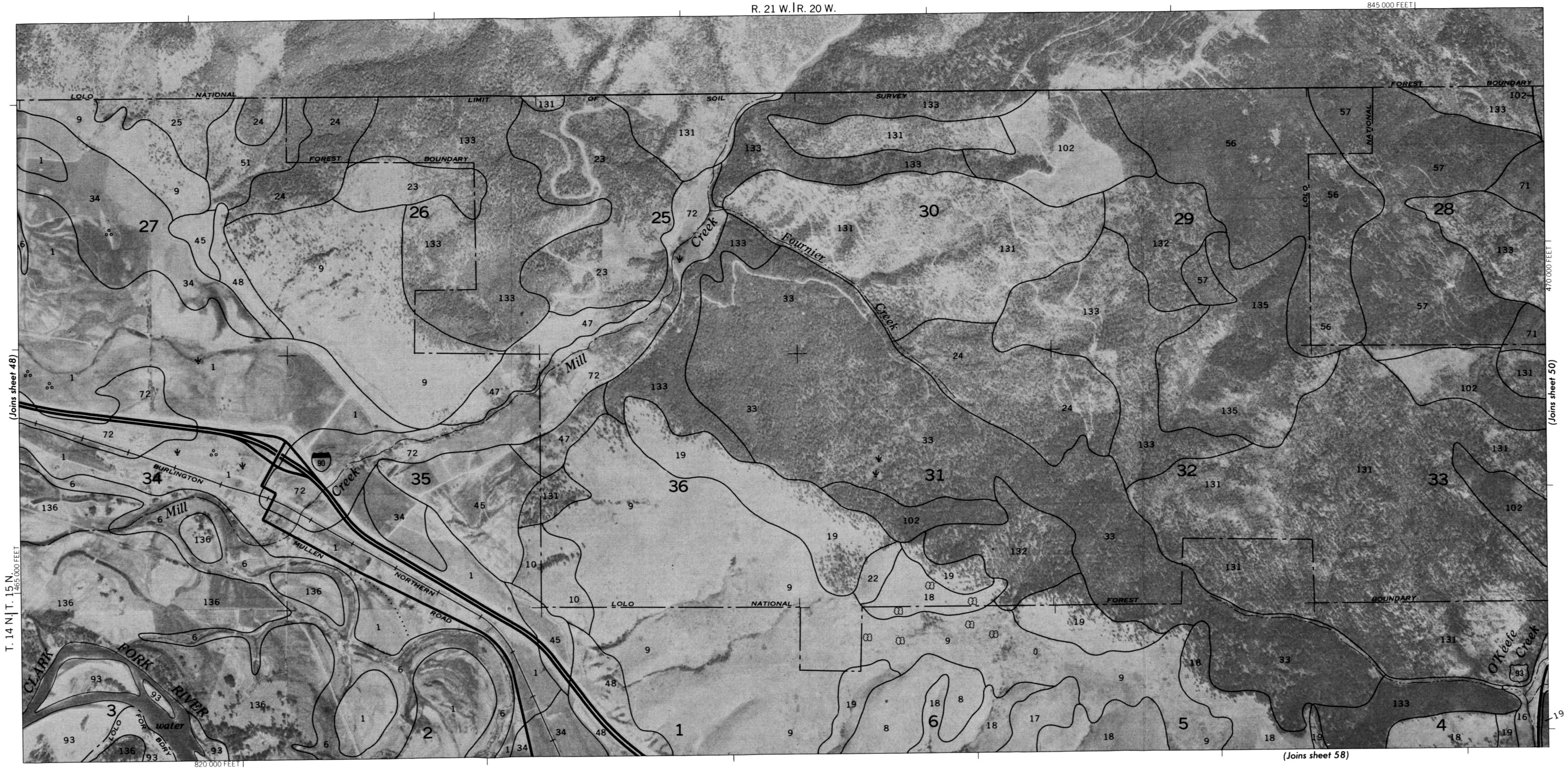
Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 48

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

49

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 49

50

N

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 50

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 51

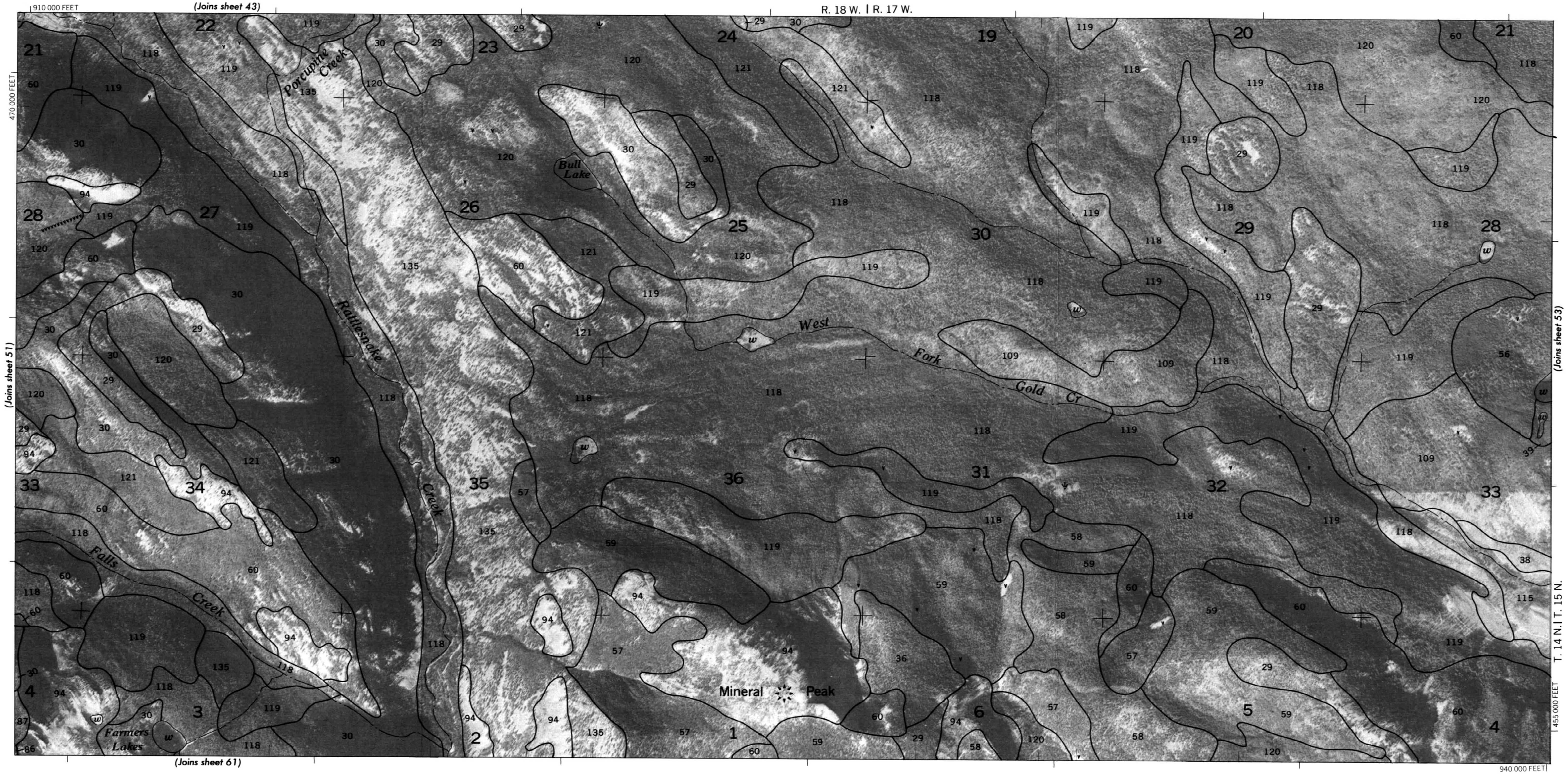
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 52



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 52

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

53

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 53

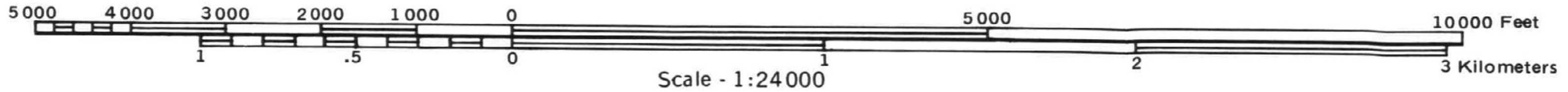
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 54



Scale - 1:24000

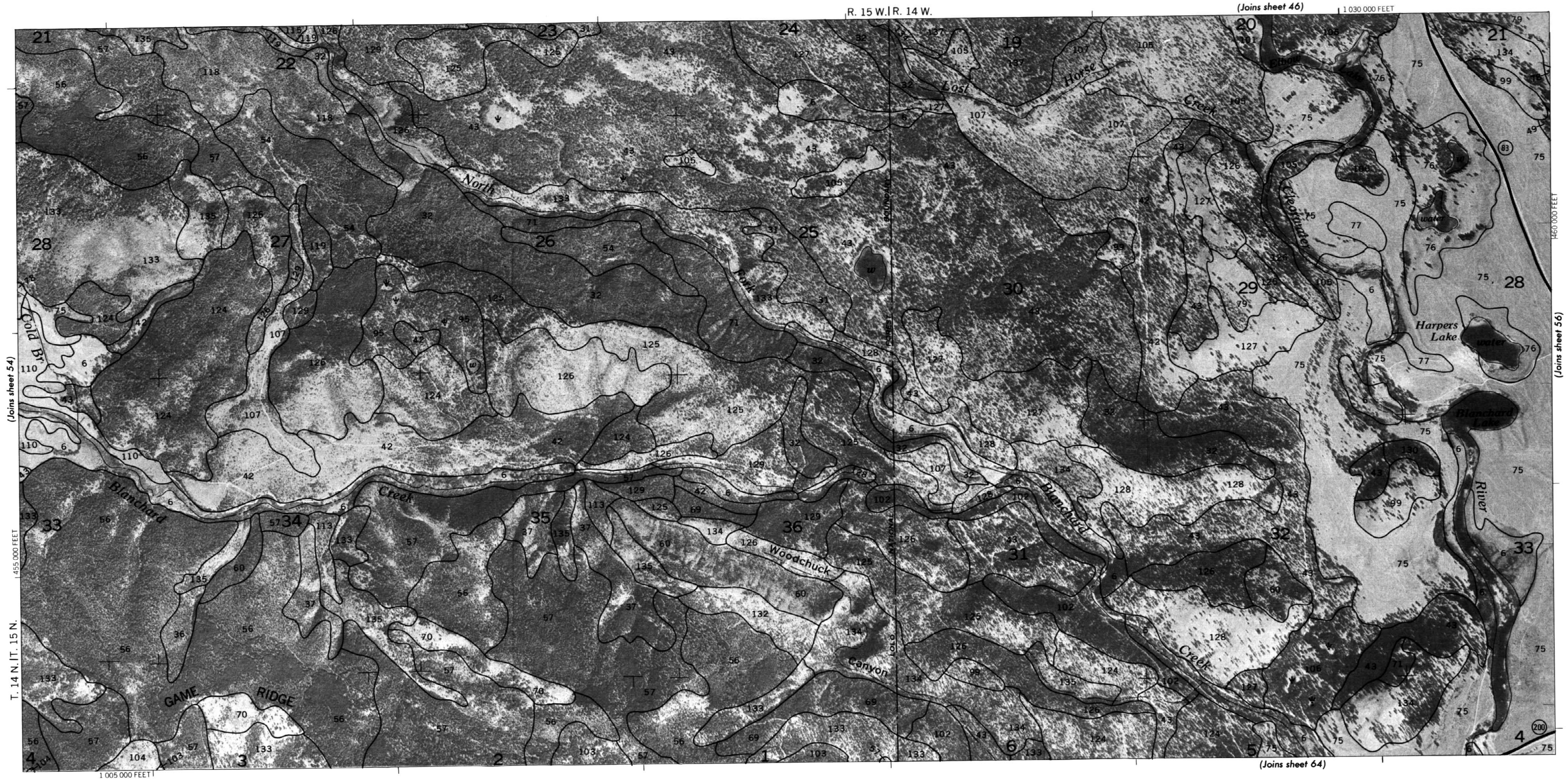
MISSOULA COUNTY AREA, MONTANA NO. 54

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 55



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 56

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 56

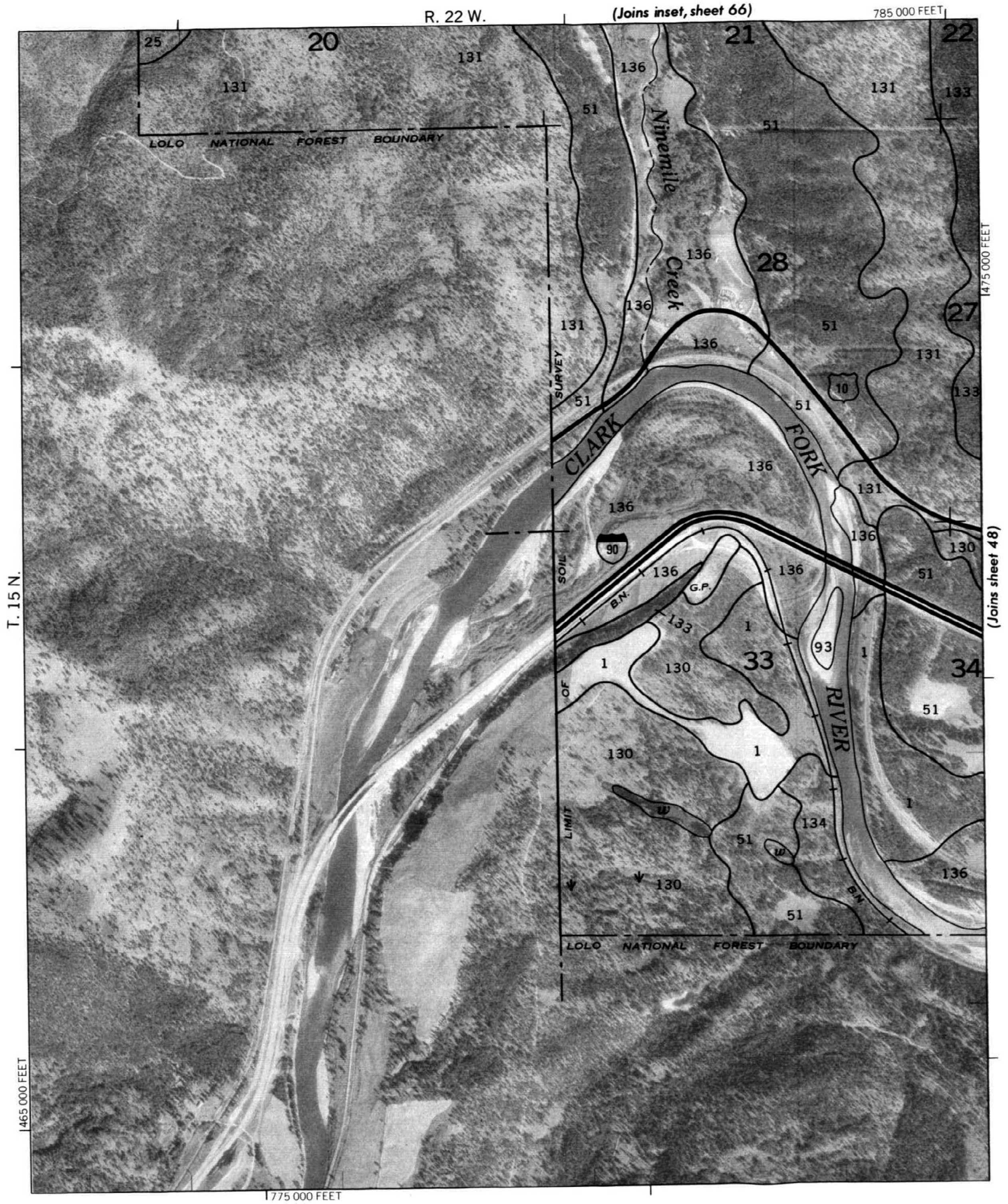
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

57

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 57



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 58

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

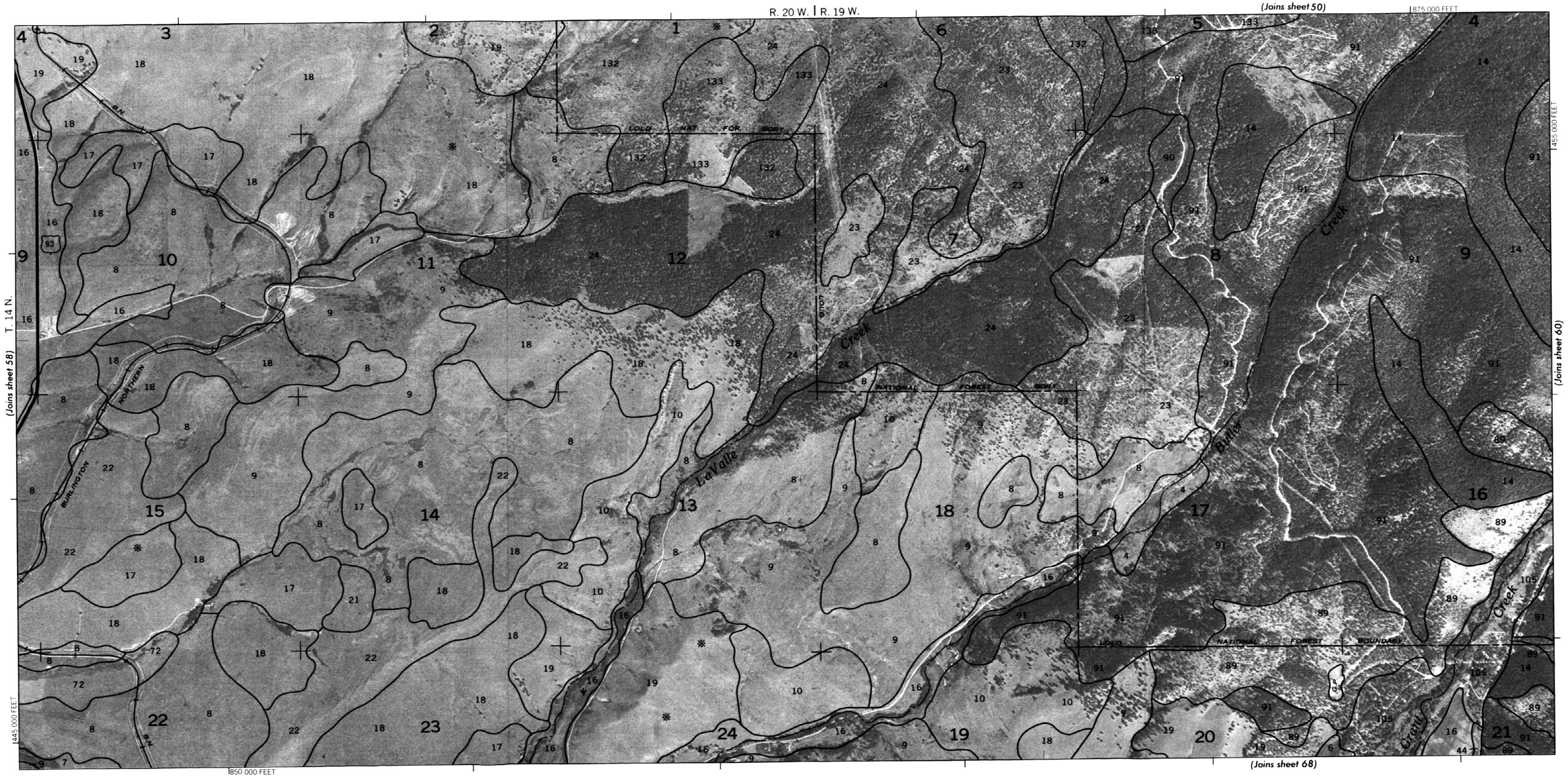
MISSOULA COUNTY AREA, MONTANA NO. 58

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 59



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 60

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 60

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 61

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 62

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 62

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 63

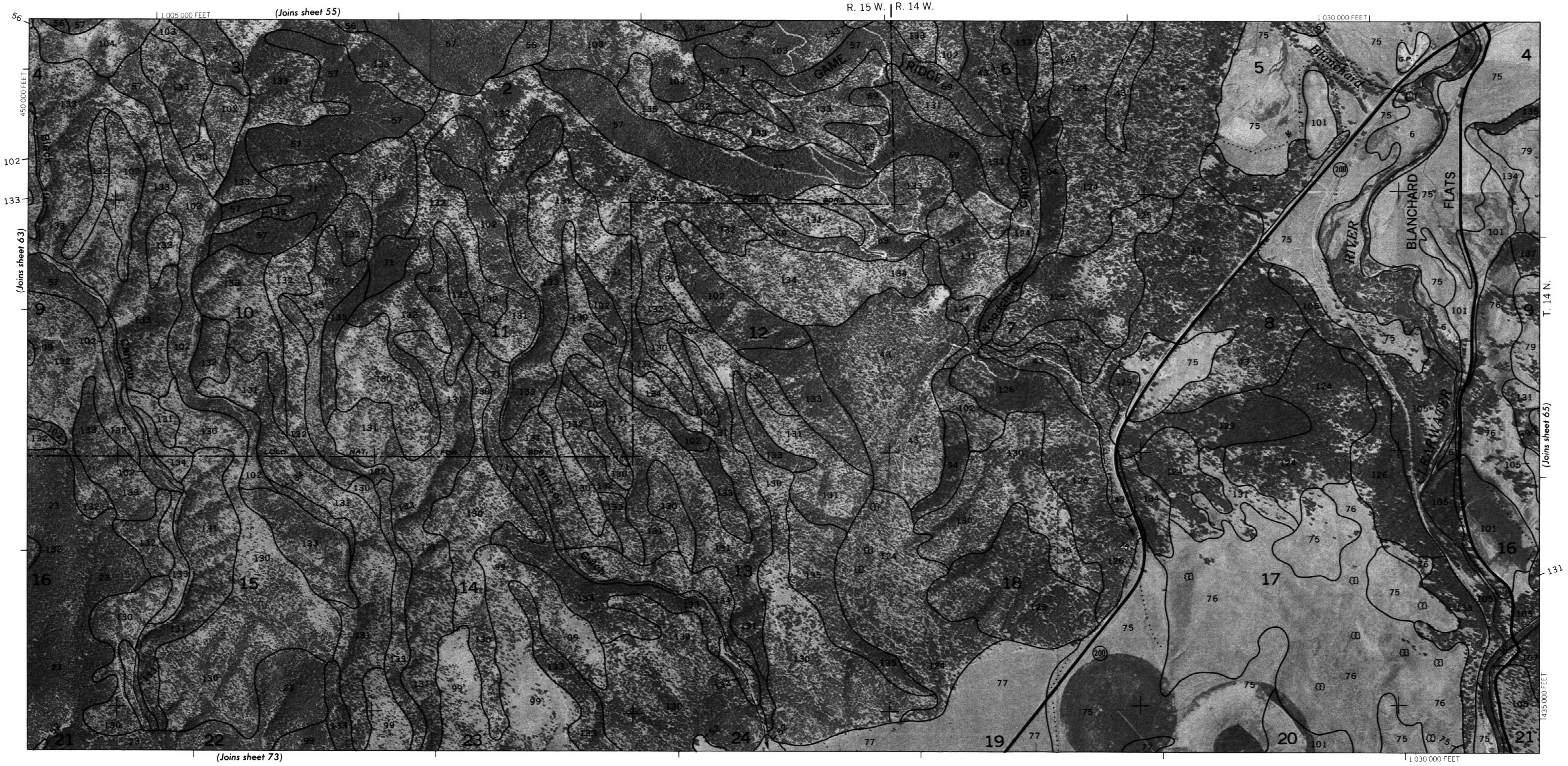
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 64



5000 4000 3000 2000 1000 0 5000 10000 Feet

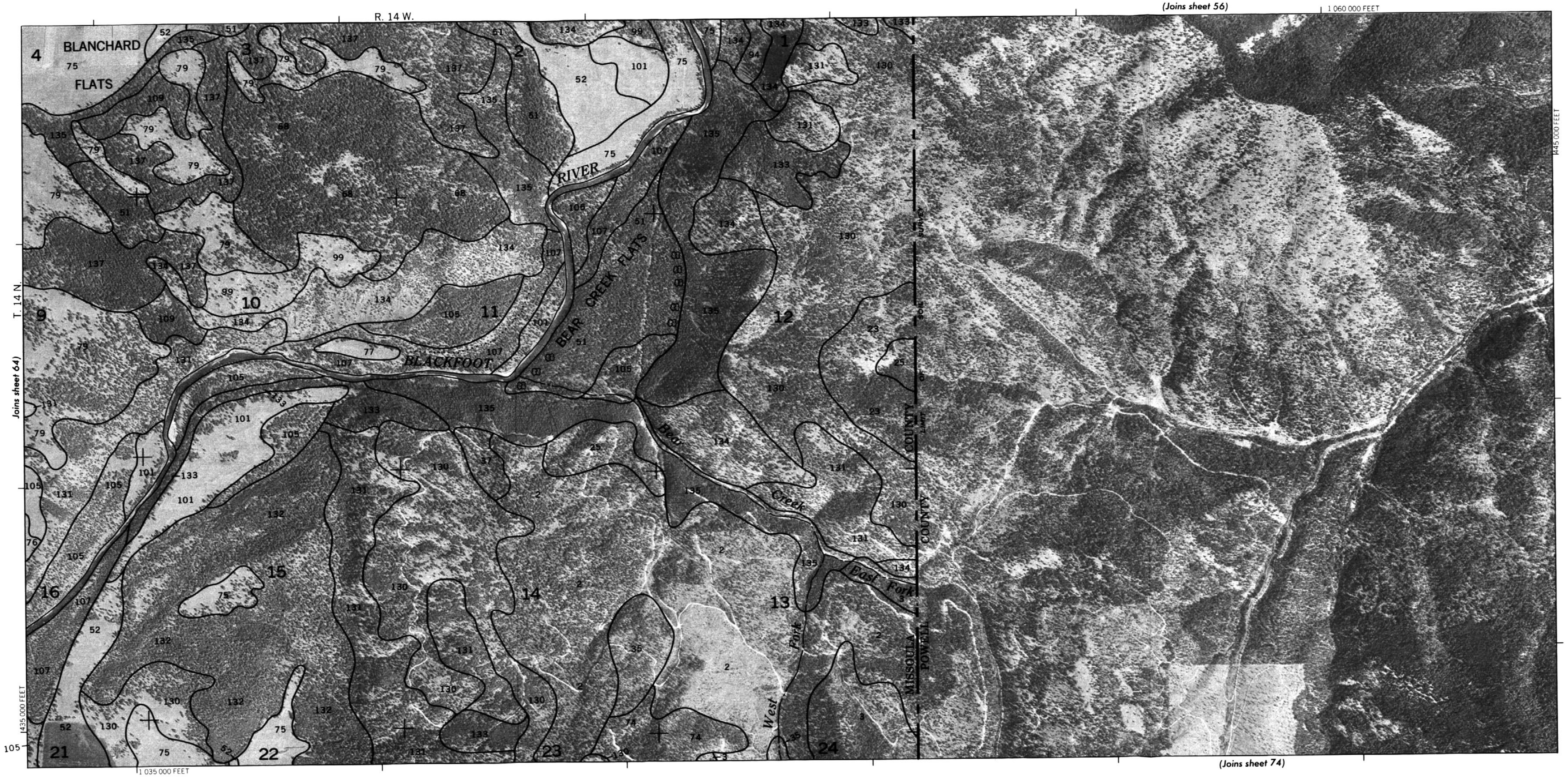
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

65

N



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 65

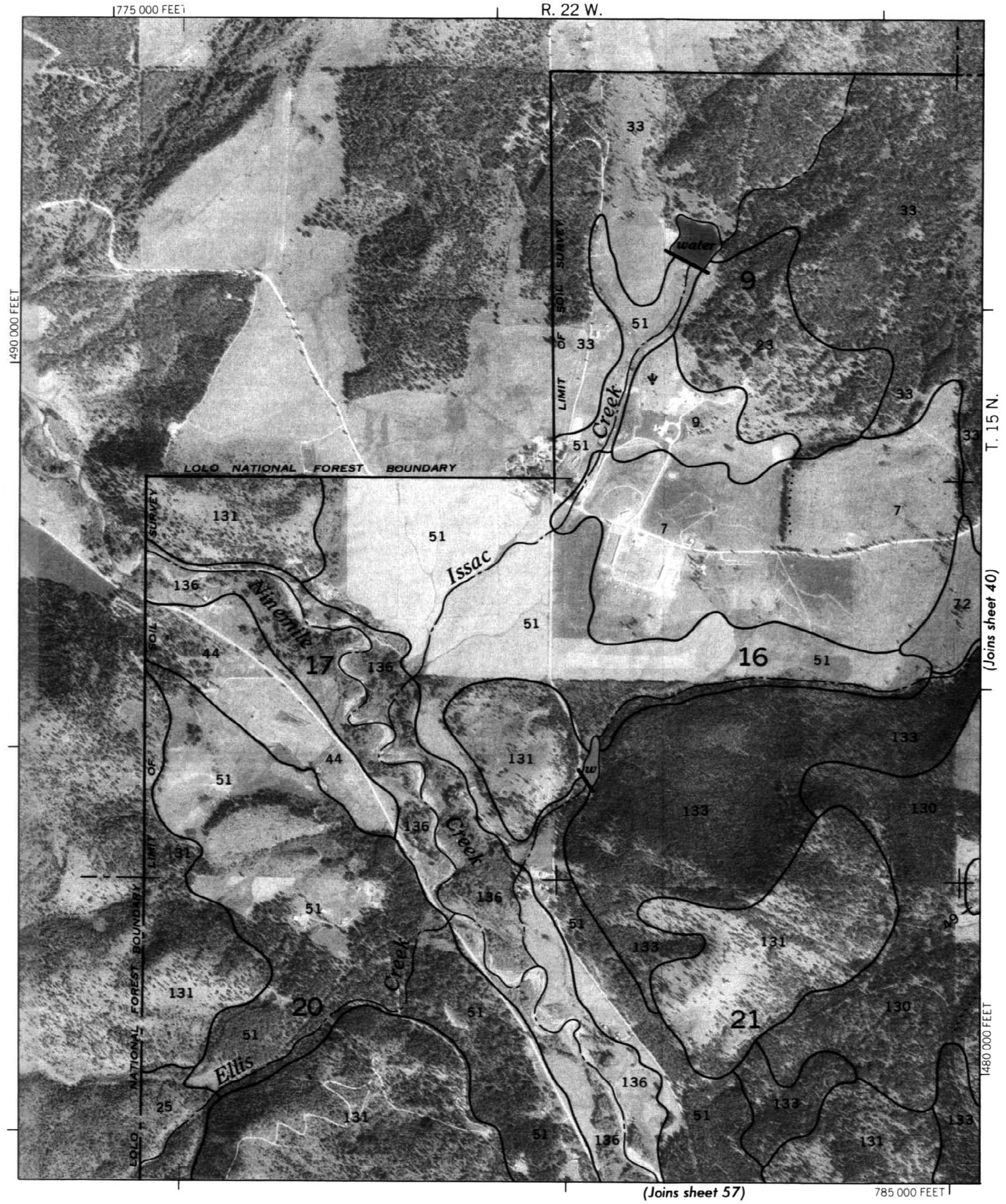
5000 4000 3000 2000 1000 0 5000 10000 Feet

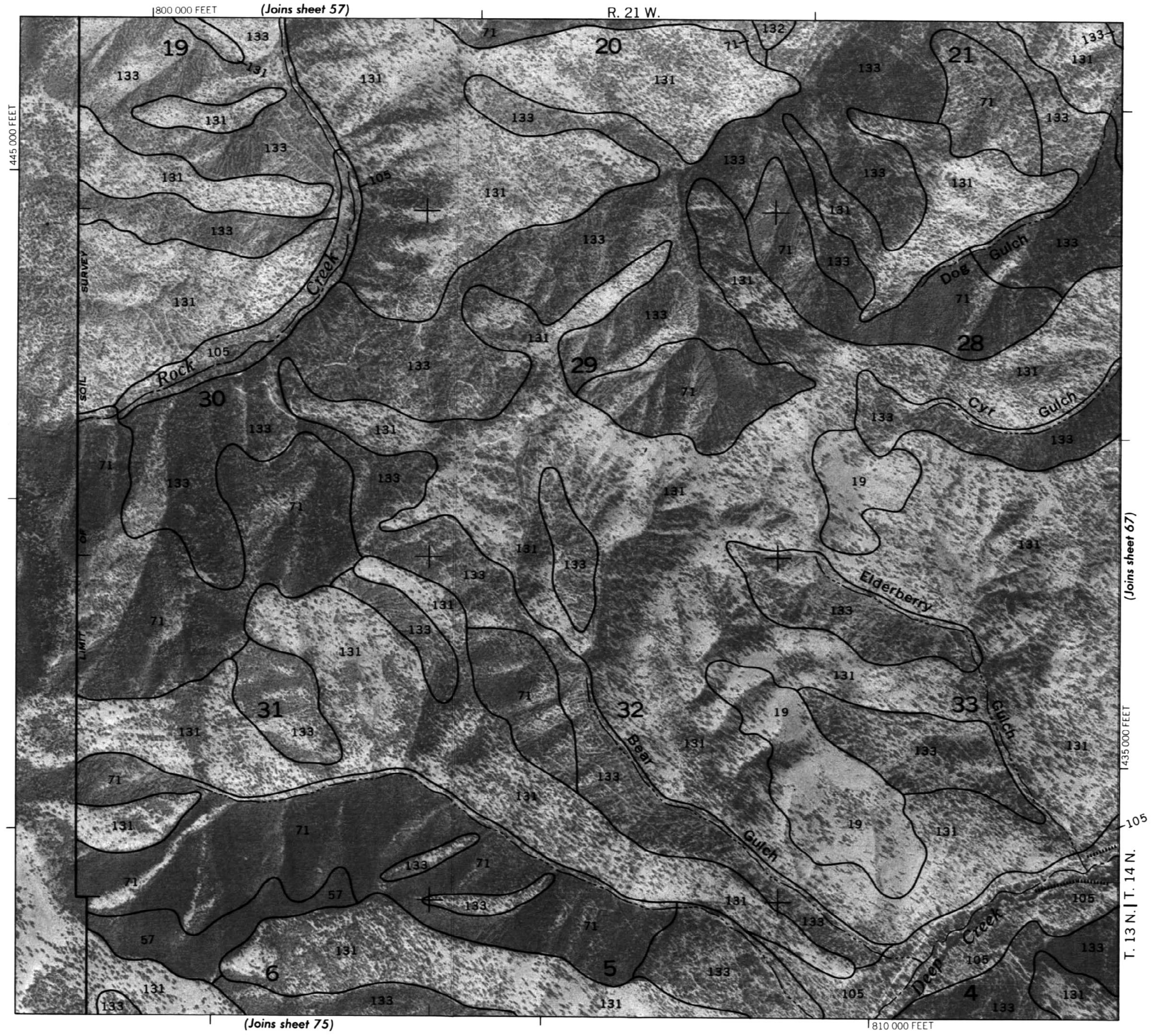
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

66

N





5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 66

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 67

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

68

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 68

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 68

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 69

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 70

N

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 70

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

71

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 71

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

72

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 72

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

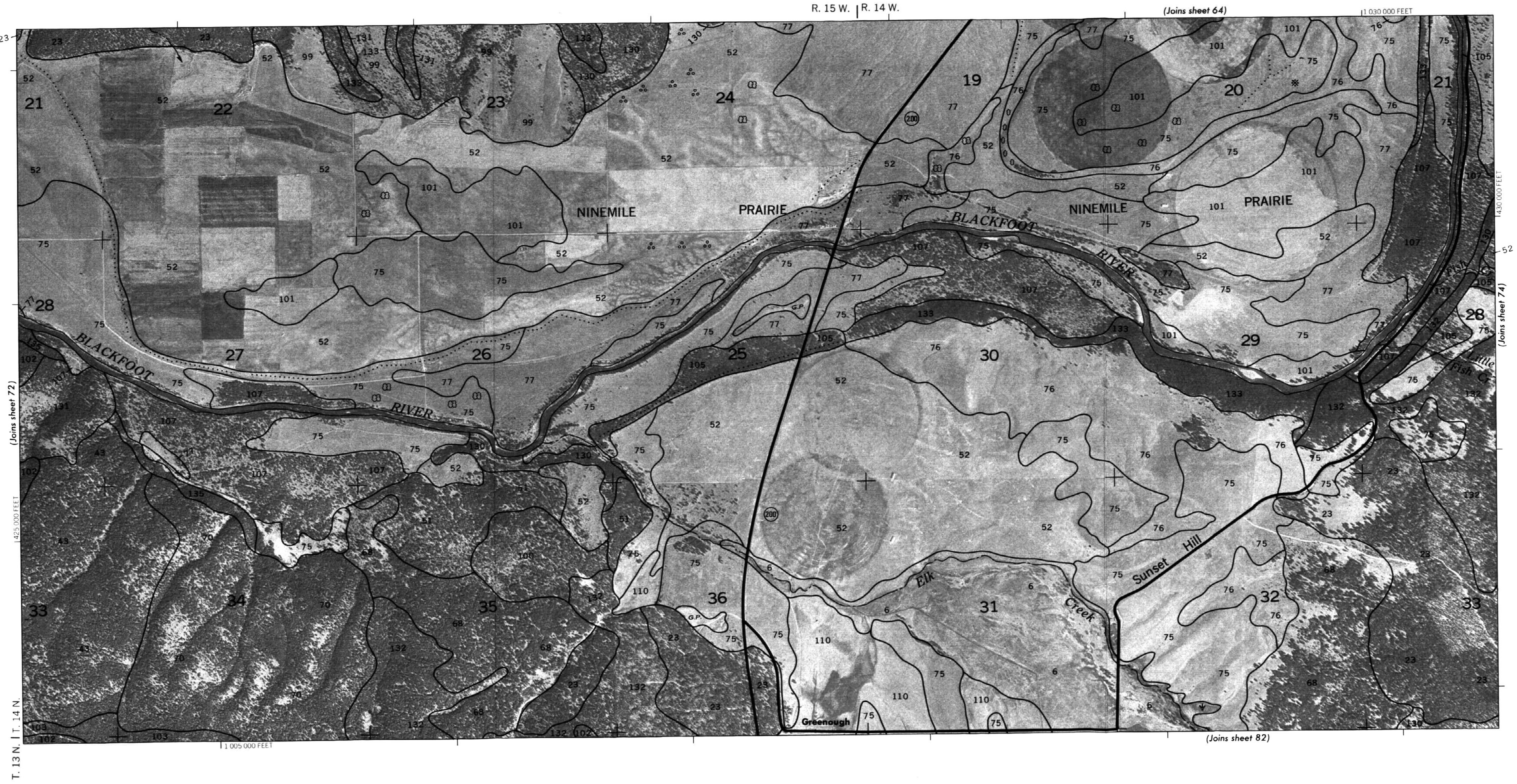
MISSOULA COUNTY AREA, MONTANA NO. 72

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 73



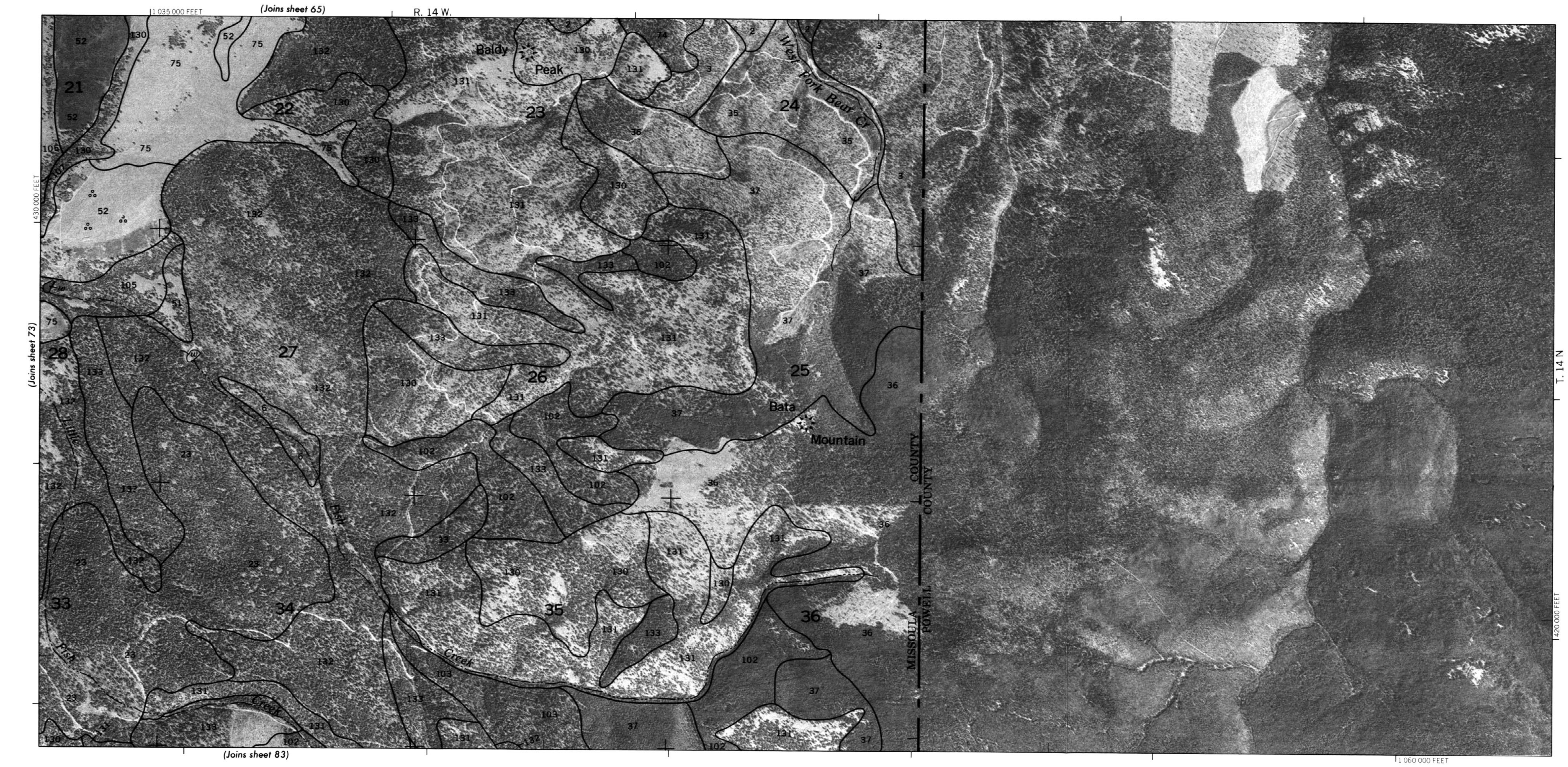
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

74

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 74

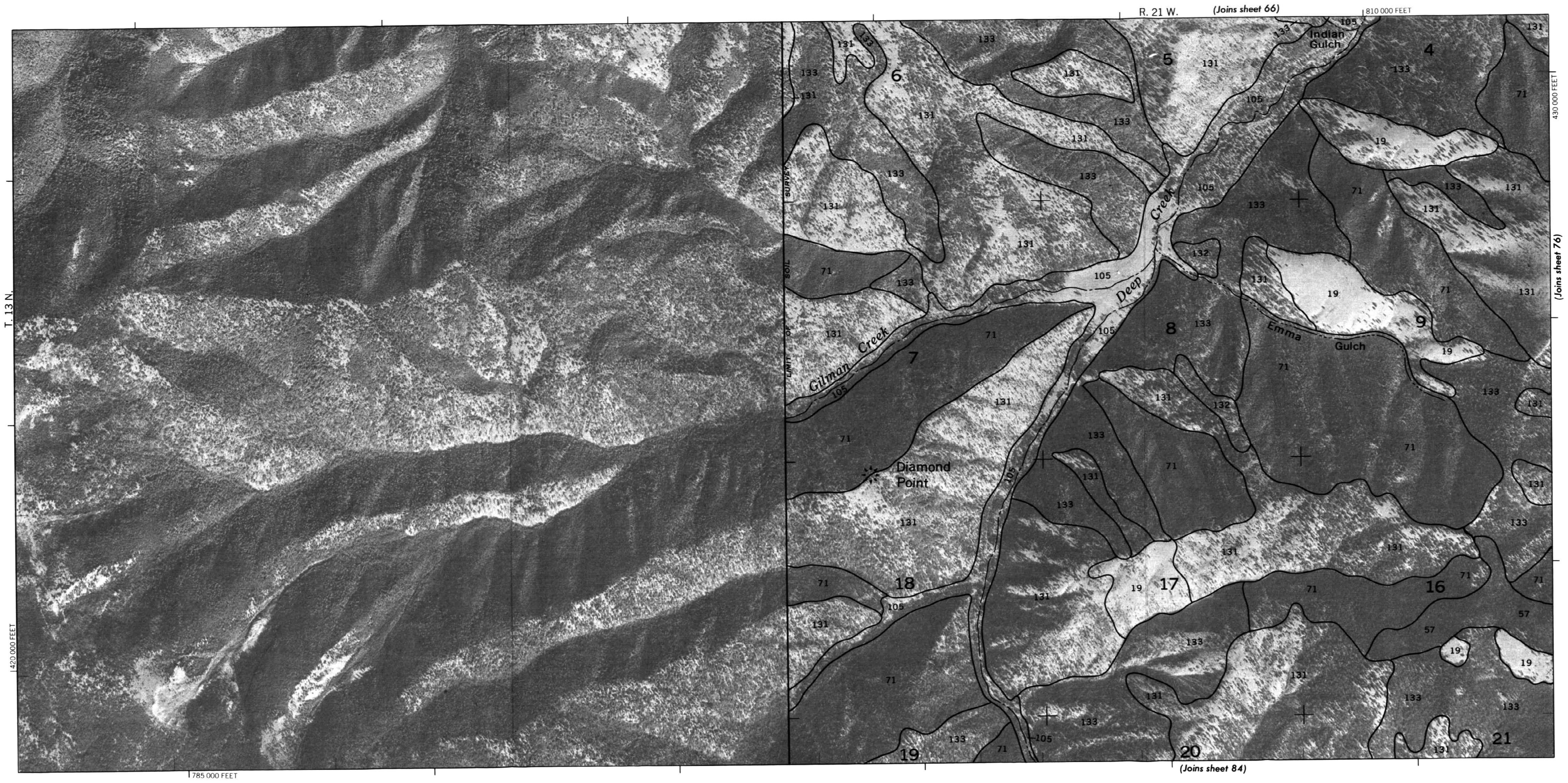
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

75

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 75



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 76

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 76

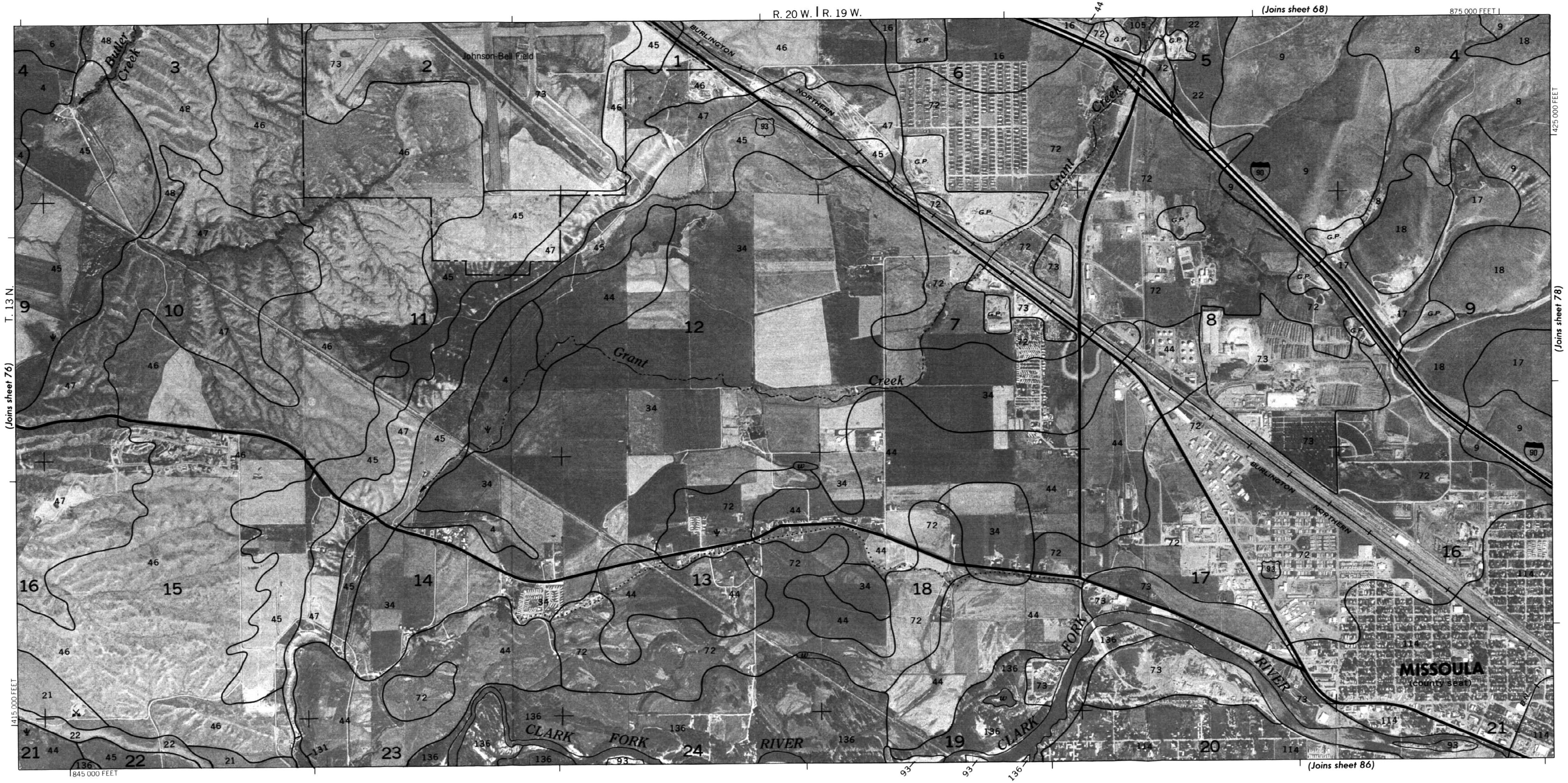
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

77

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 77



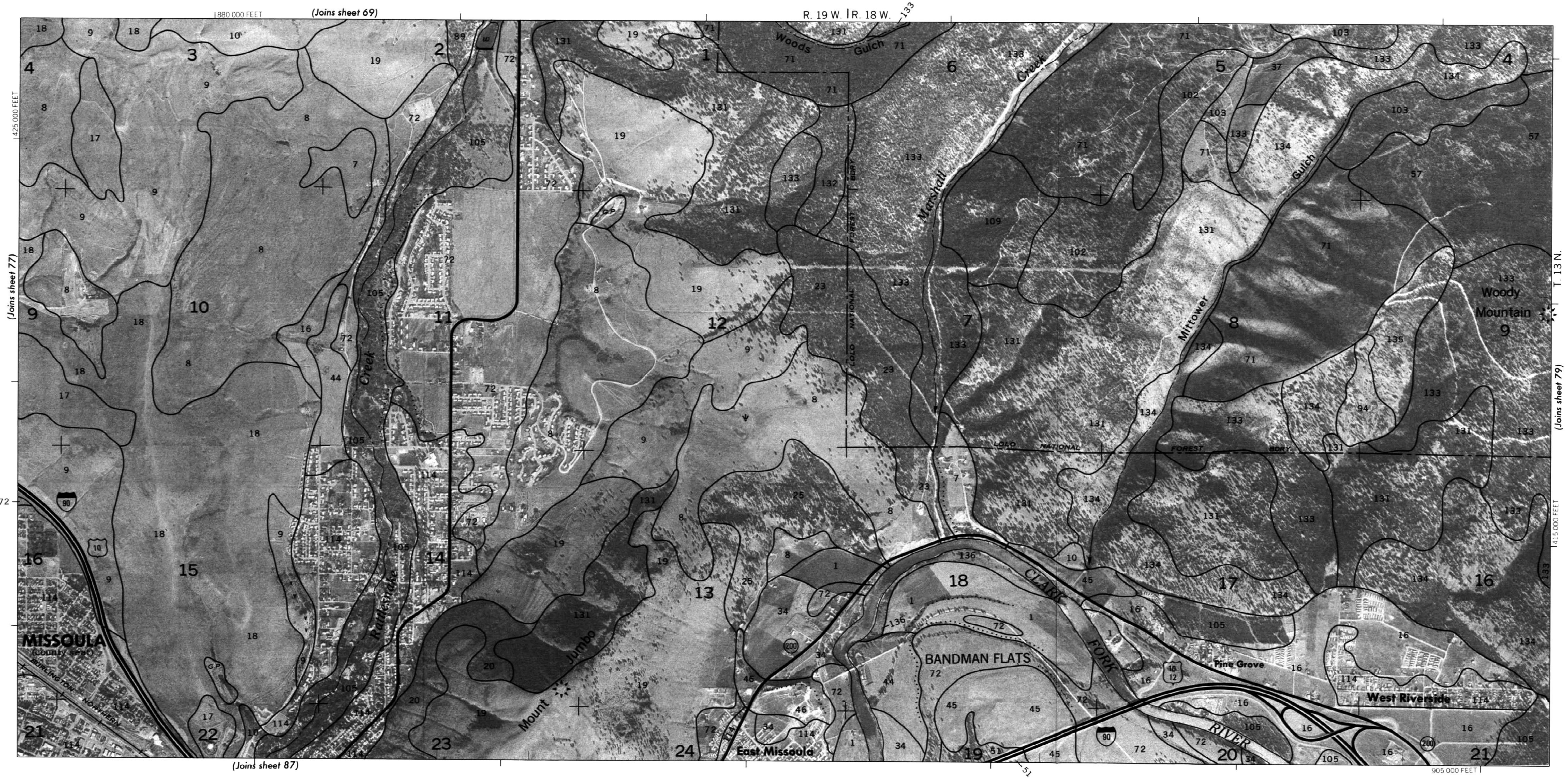
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 78



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 78

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

79

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial
photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 79

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

80

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 80

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 80

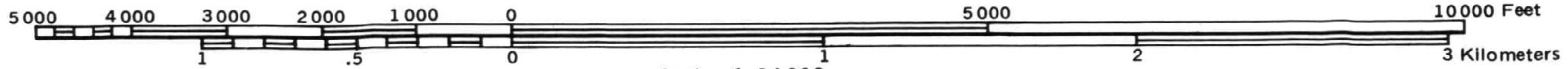
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

81

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 81



Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 82

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 82

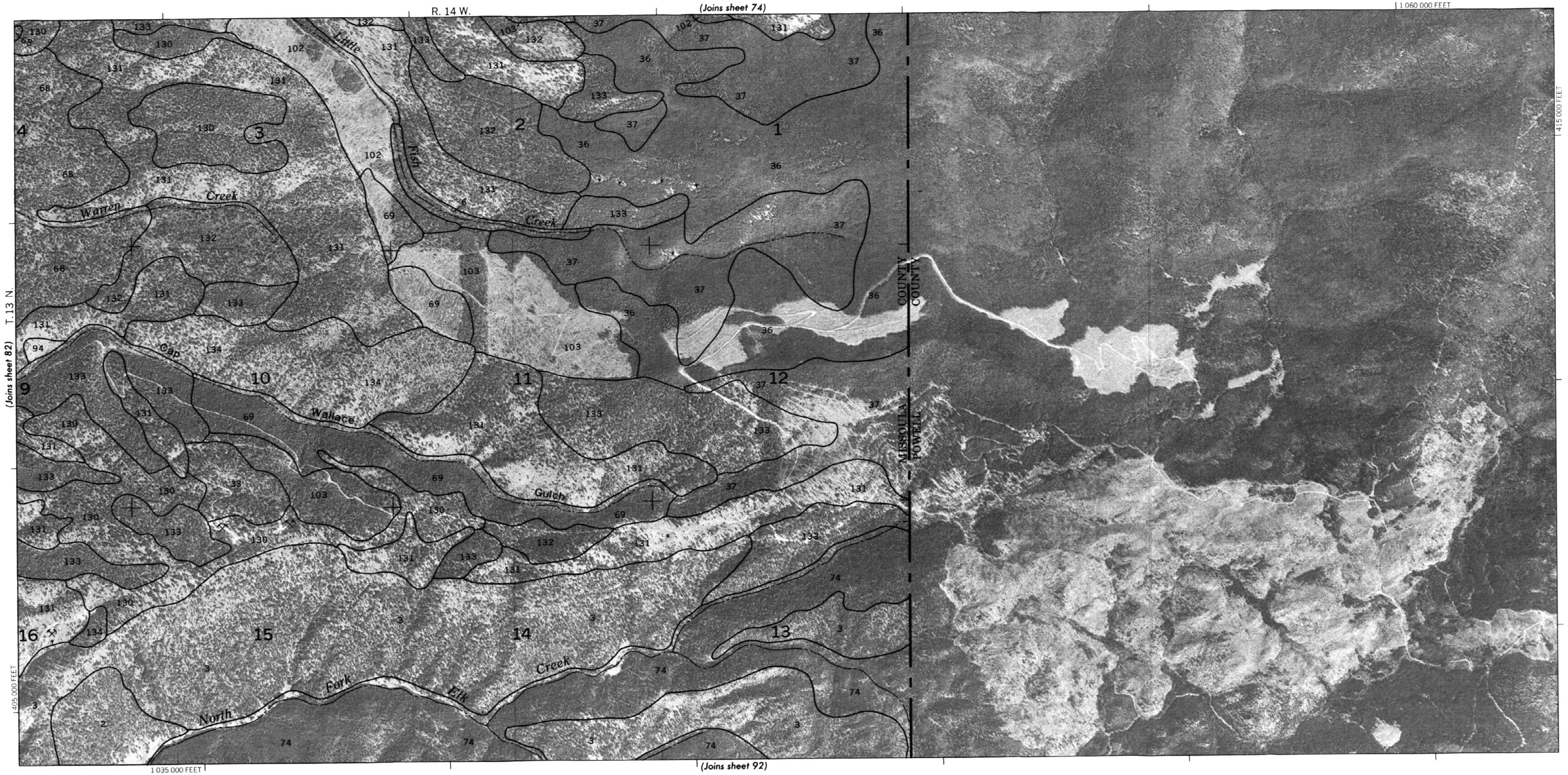
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

83

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 83



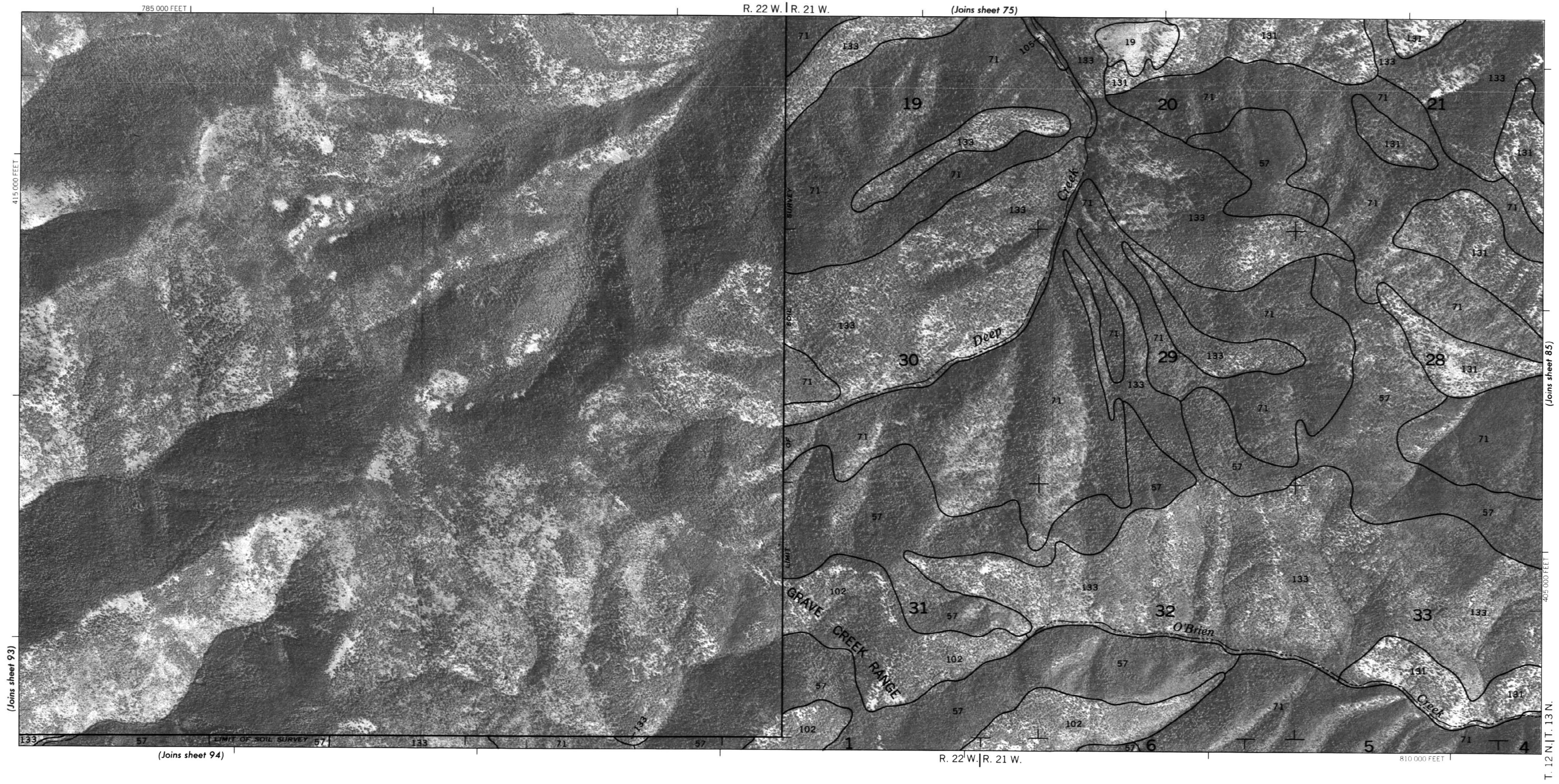
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 84



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

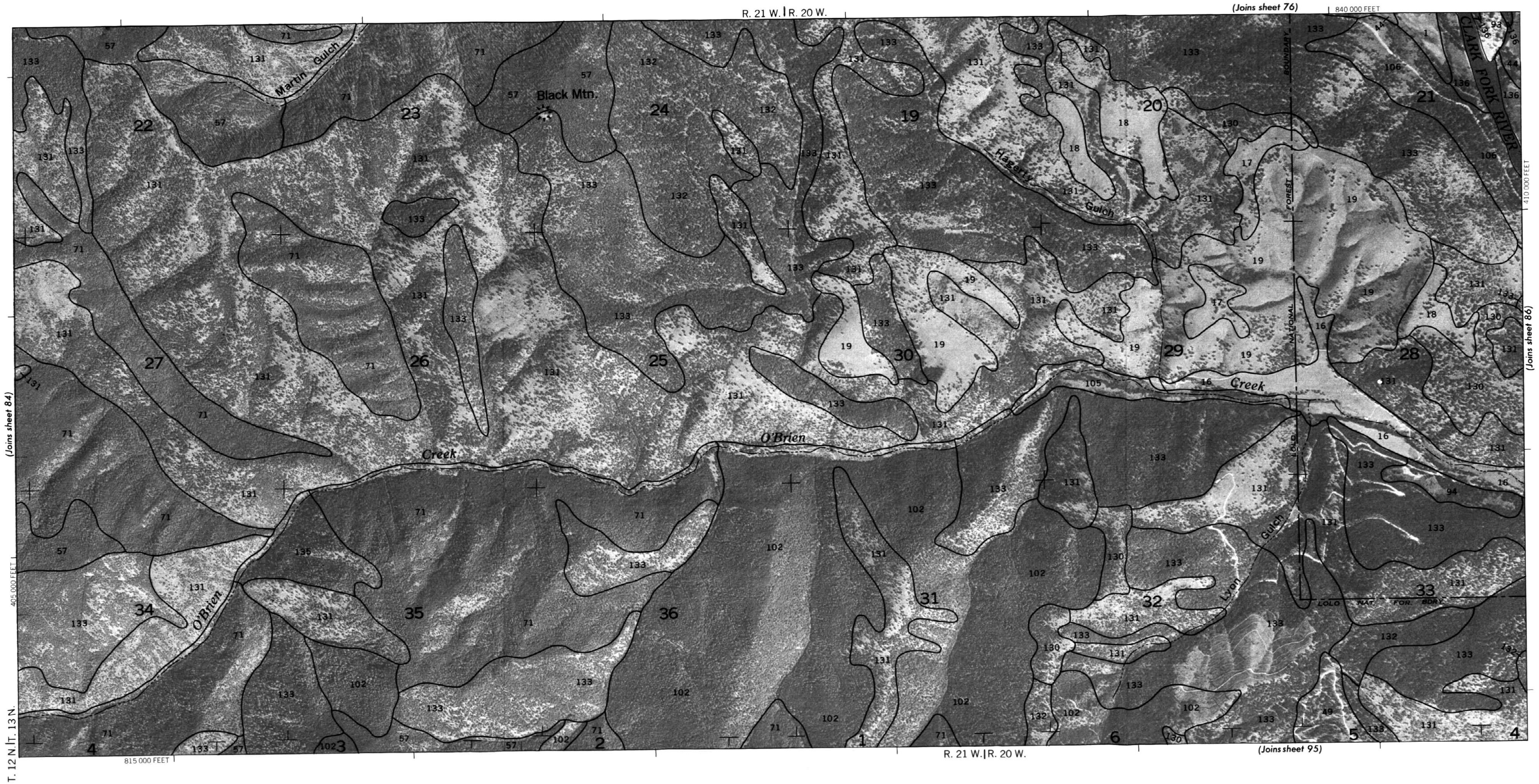
MISSOULA COUNTY AREA, MONTANA NO. 84

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 85



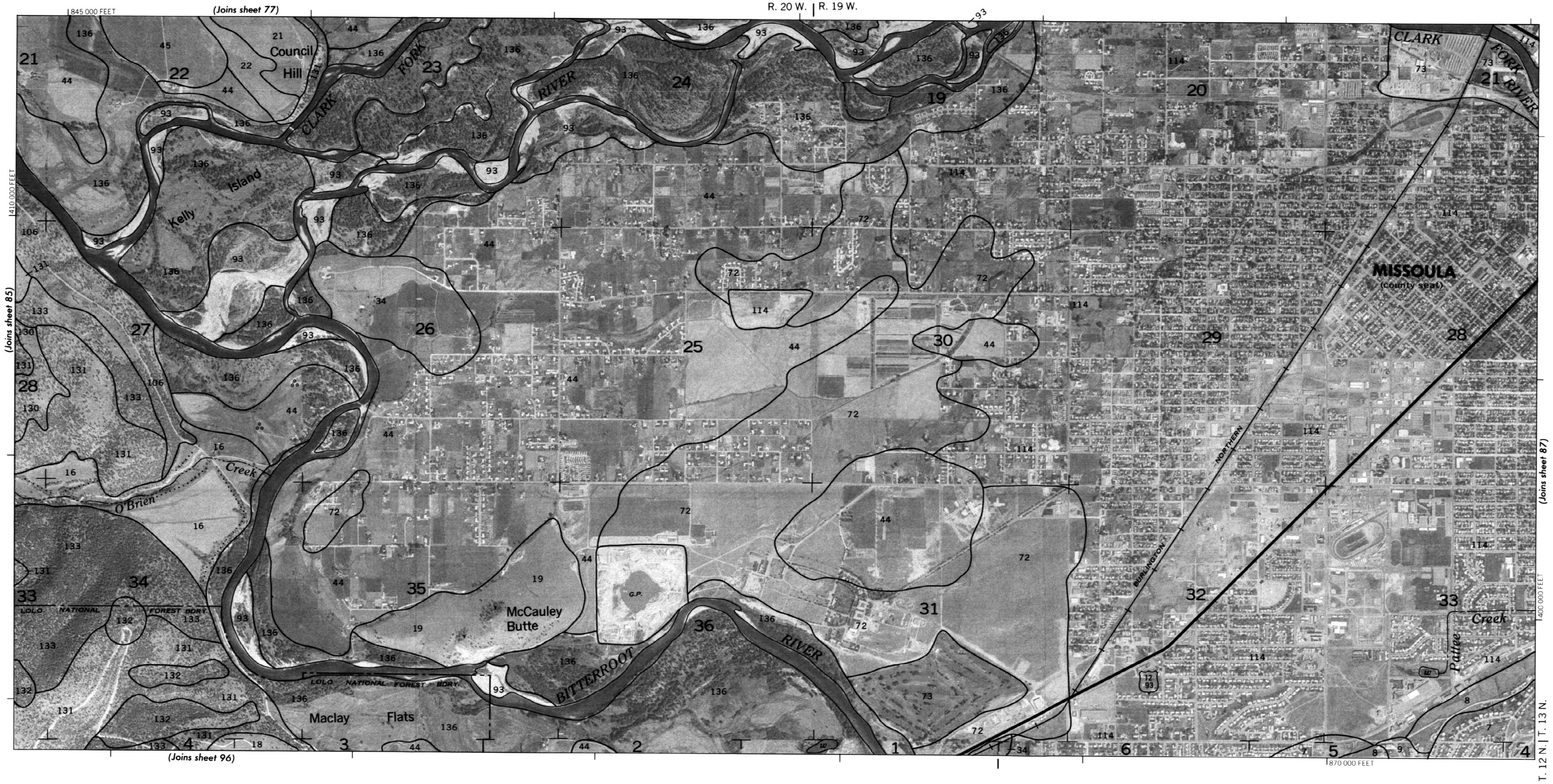
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 86



5000 4000 3000 2000 1000 0 5000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

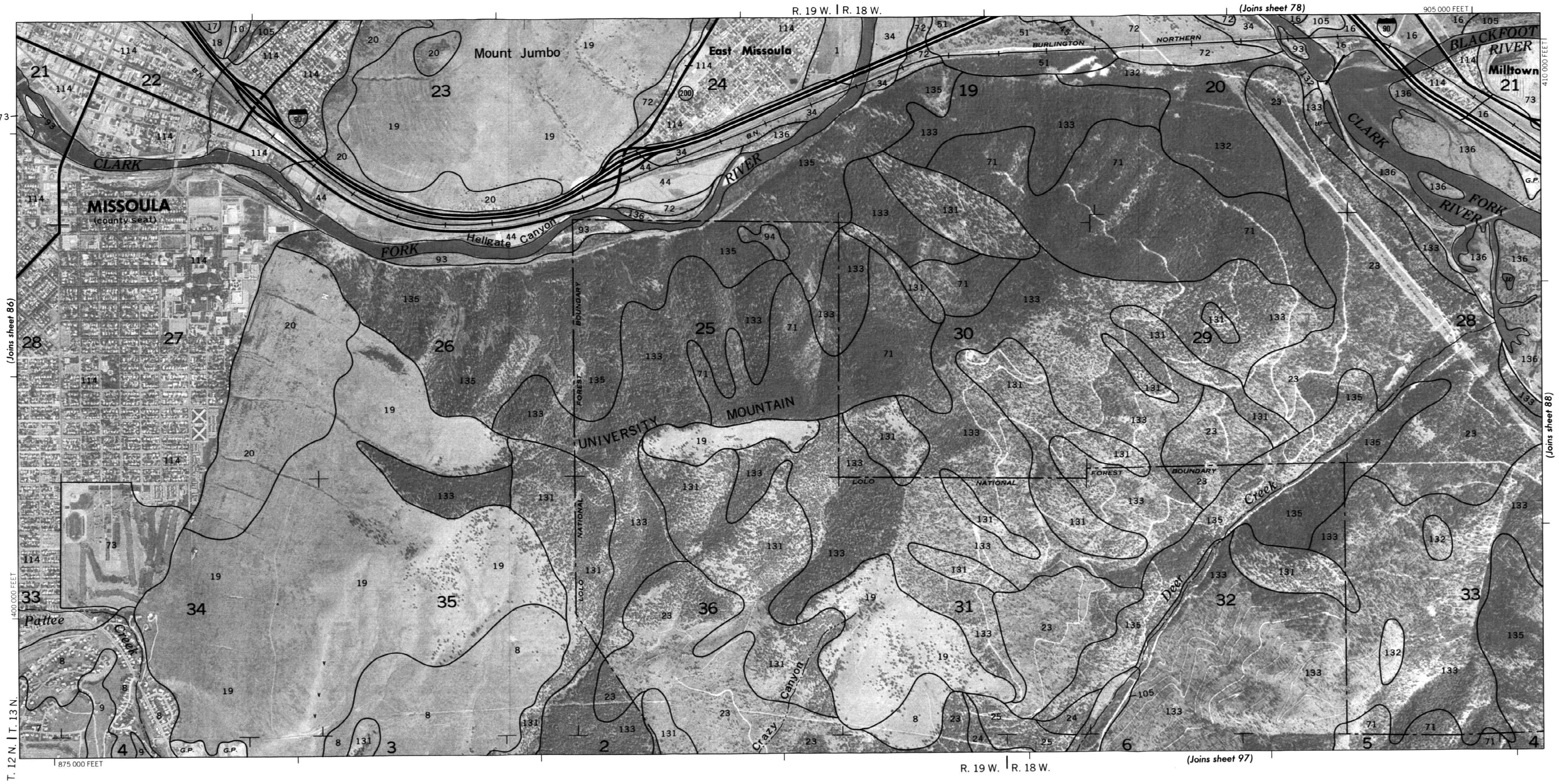
MISSOULA COUNTY AREA, MONTANA NO. 86

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 87



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 88

MISSOULA COUNTY AREA, MONTANA NO. 88

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

89

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 89

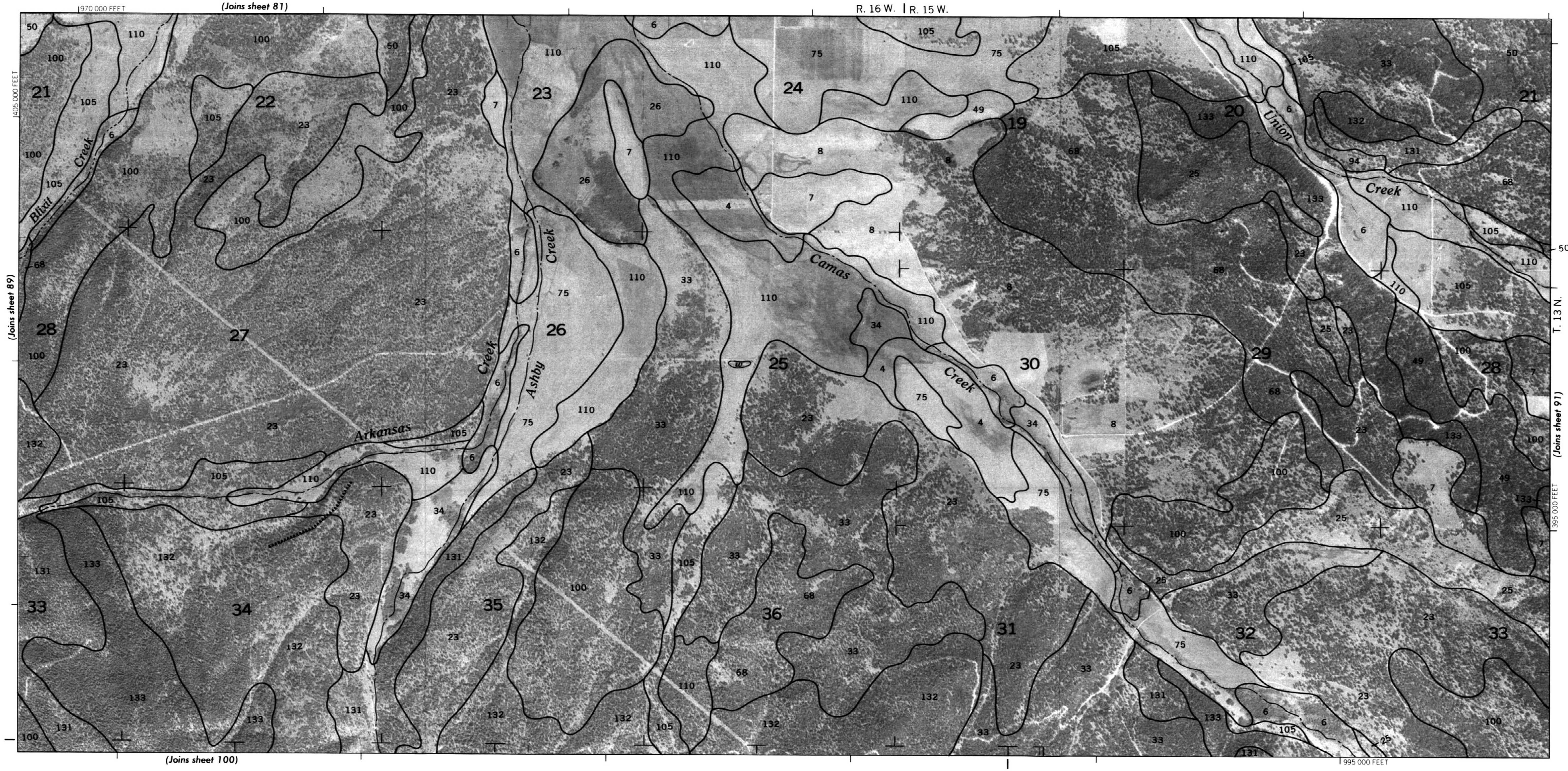
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 90



5000 4000 3000 2000 1000 0 5000 10000 Feet

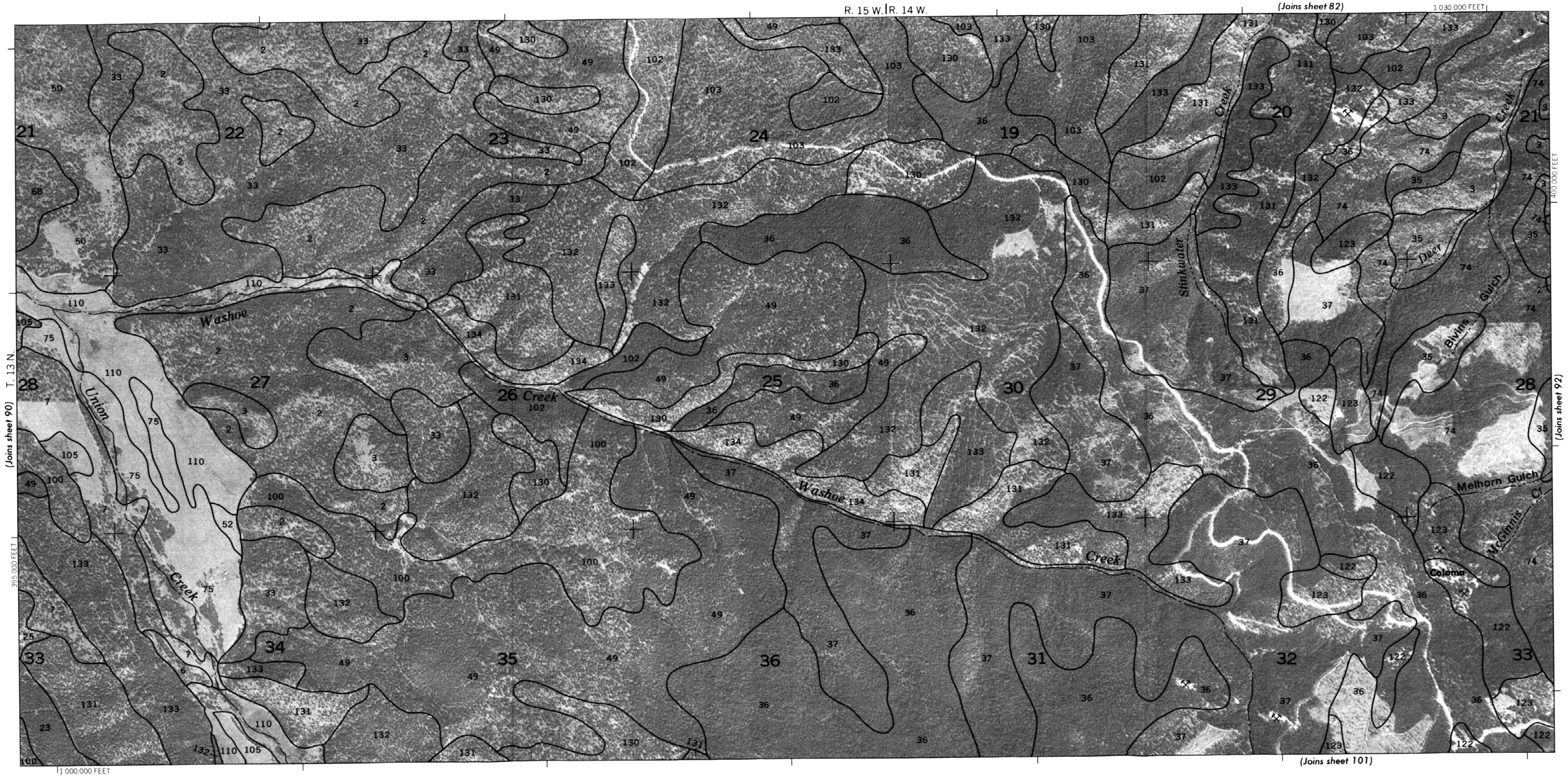
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 90

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

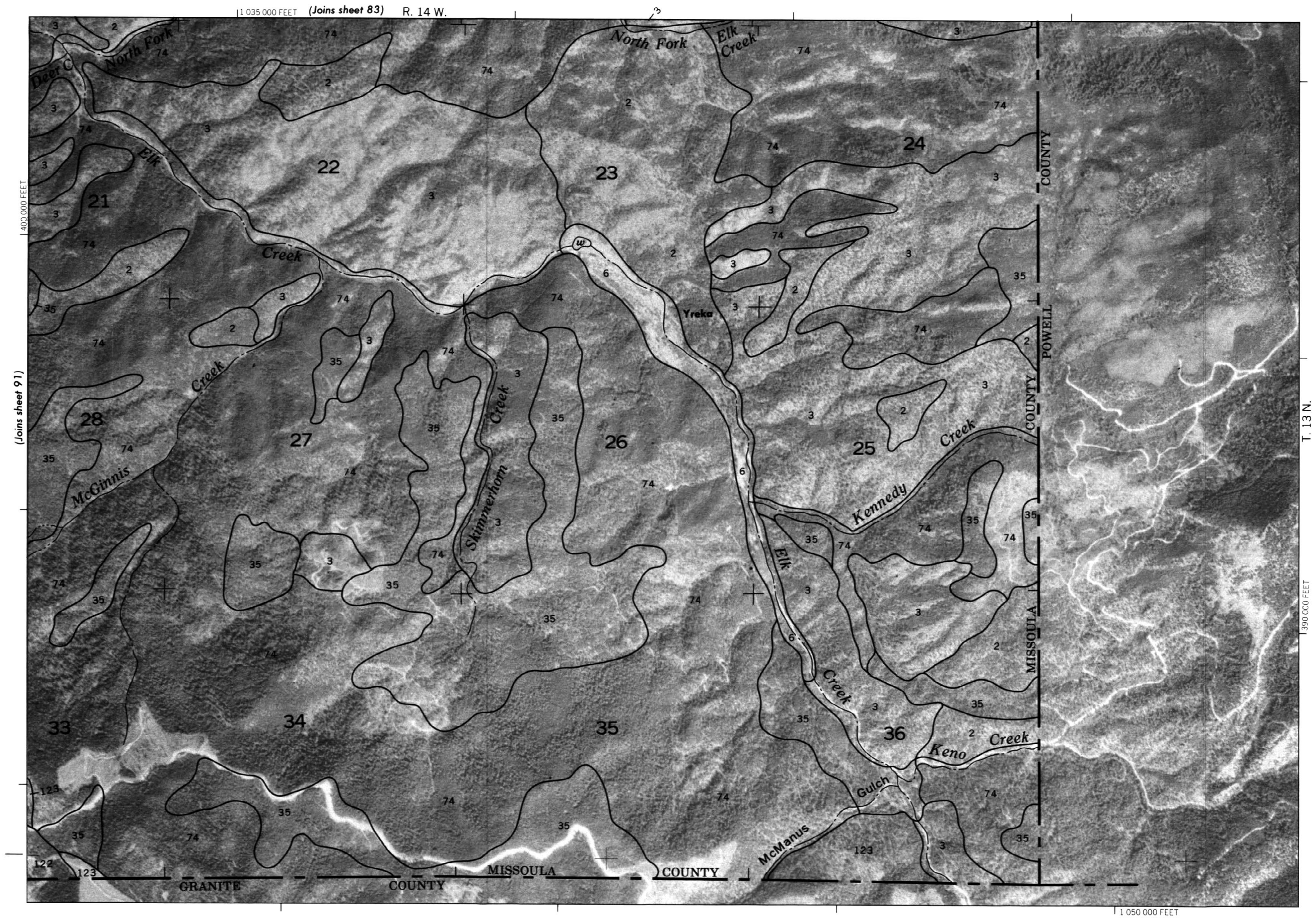
Scale - 1:24000

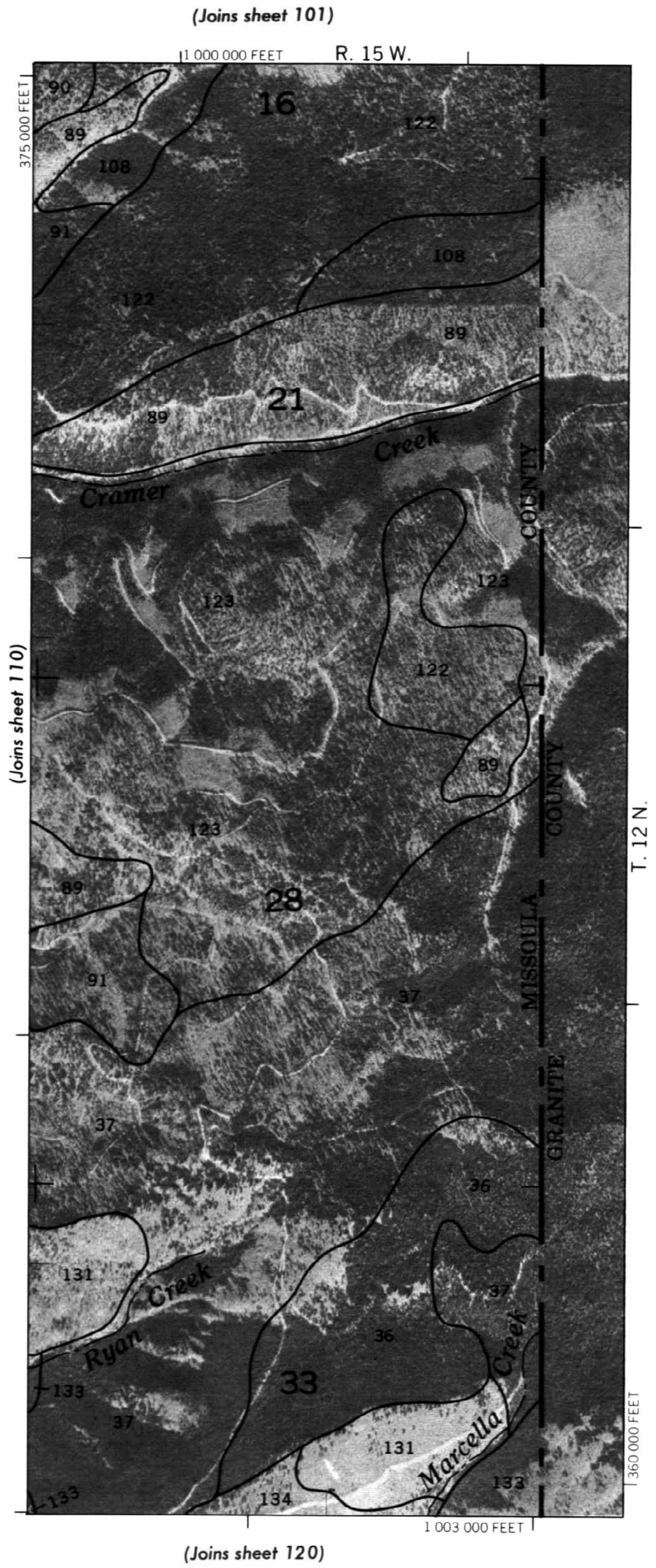
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 91

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 92





3000 AND 5000-FOOT GRID TICKS

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

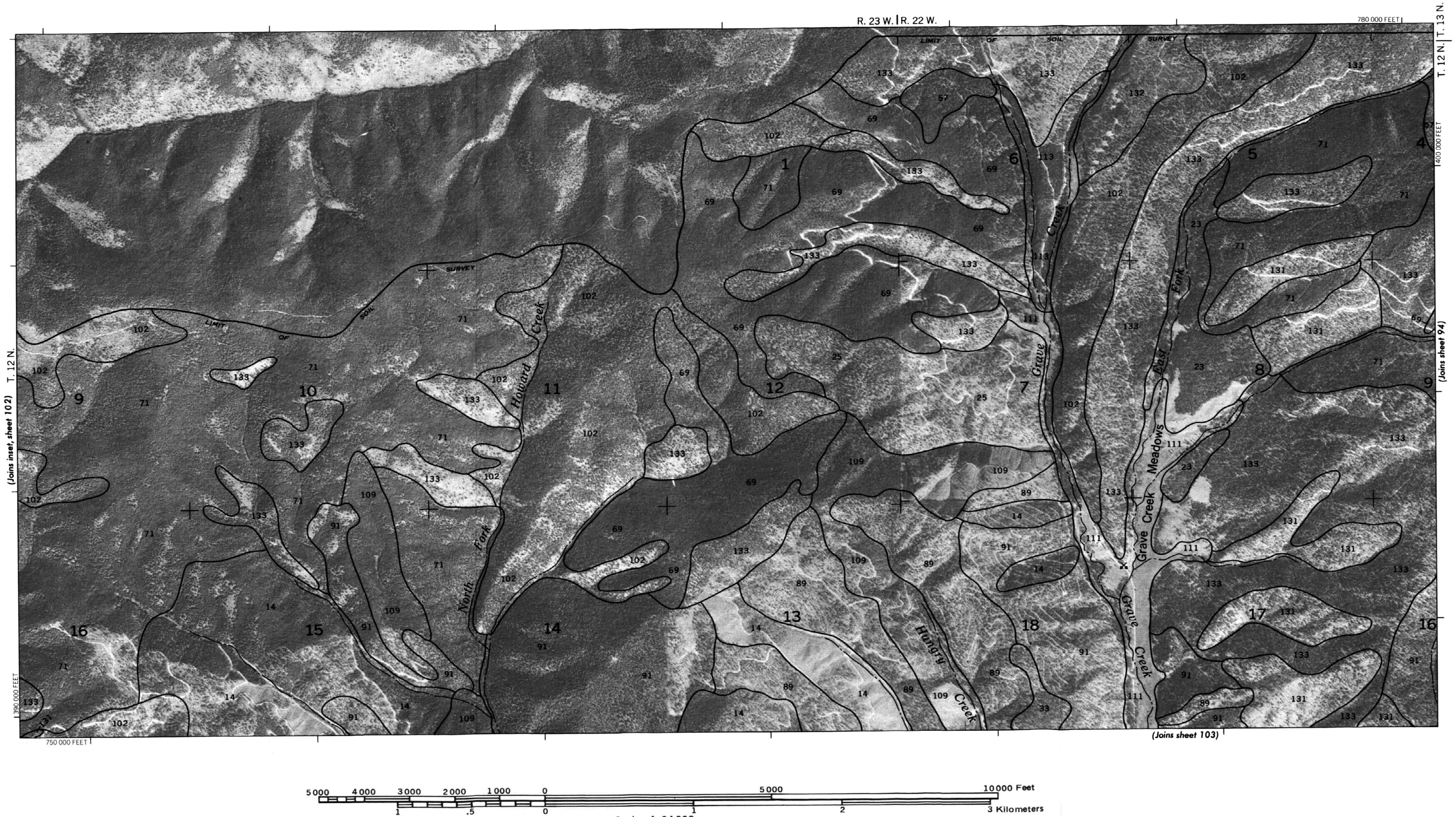
MISSOULA COUNTY AREA, MONTANA NO. 92

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 93



Scale - 1:24 000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 94

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 94

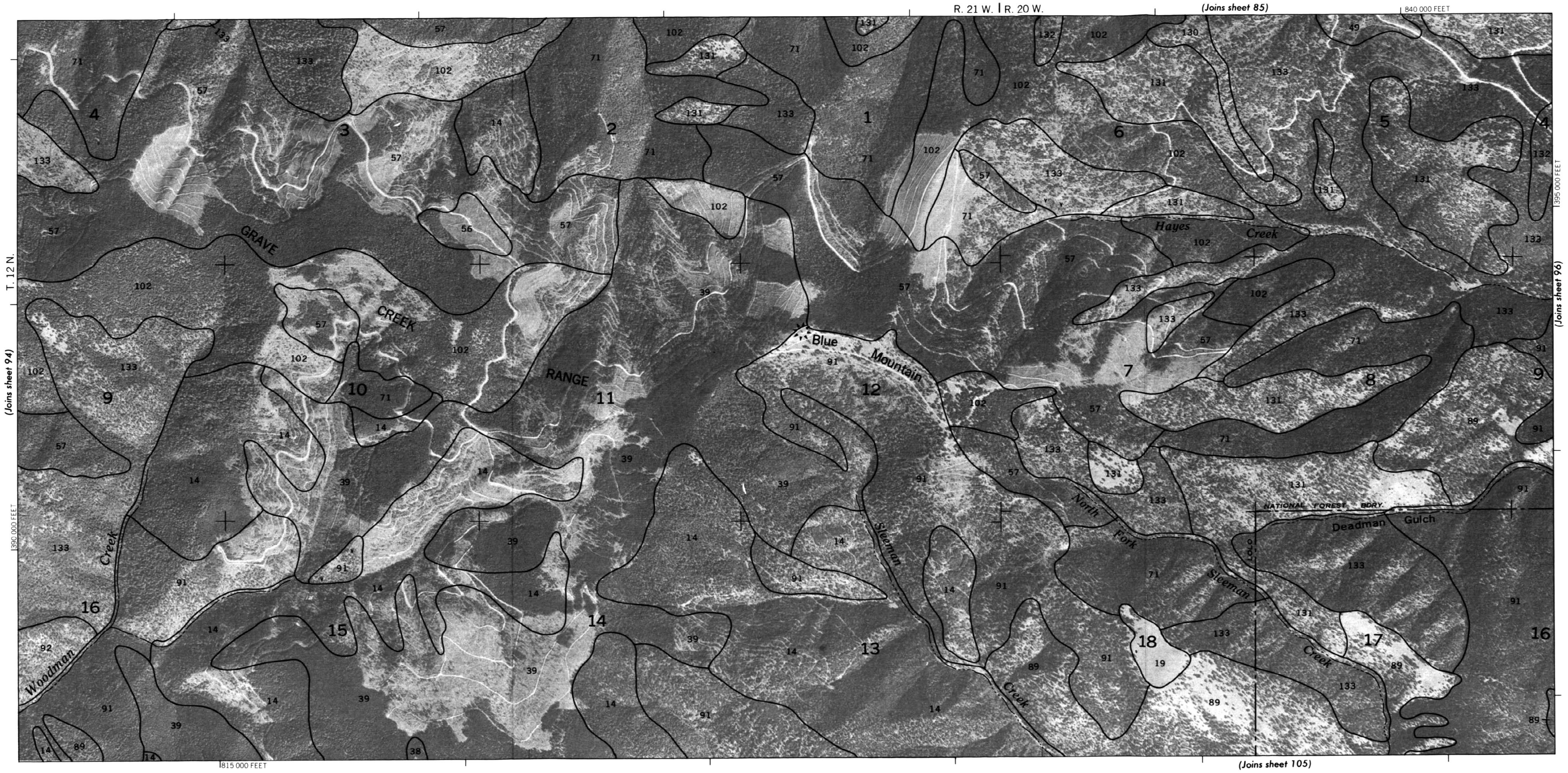
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

95

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 95



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 96

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 96

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

97

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 97

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 98

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 98

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

99

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 99

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

(100)

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 100

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

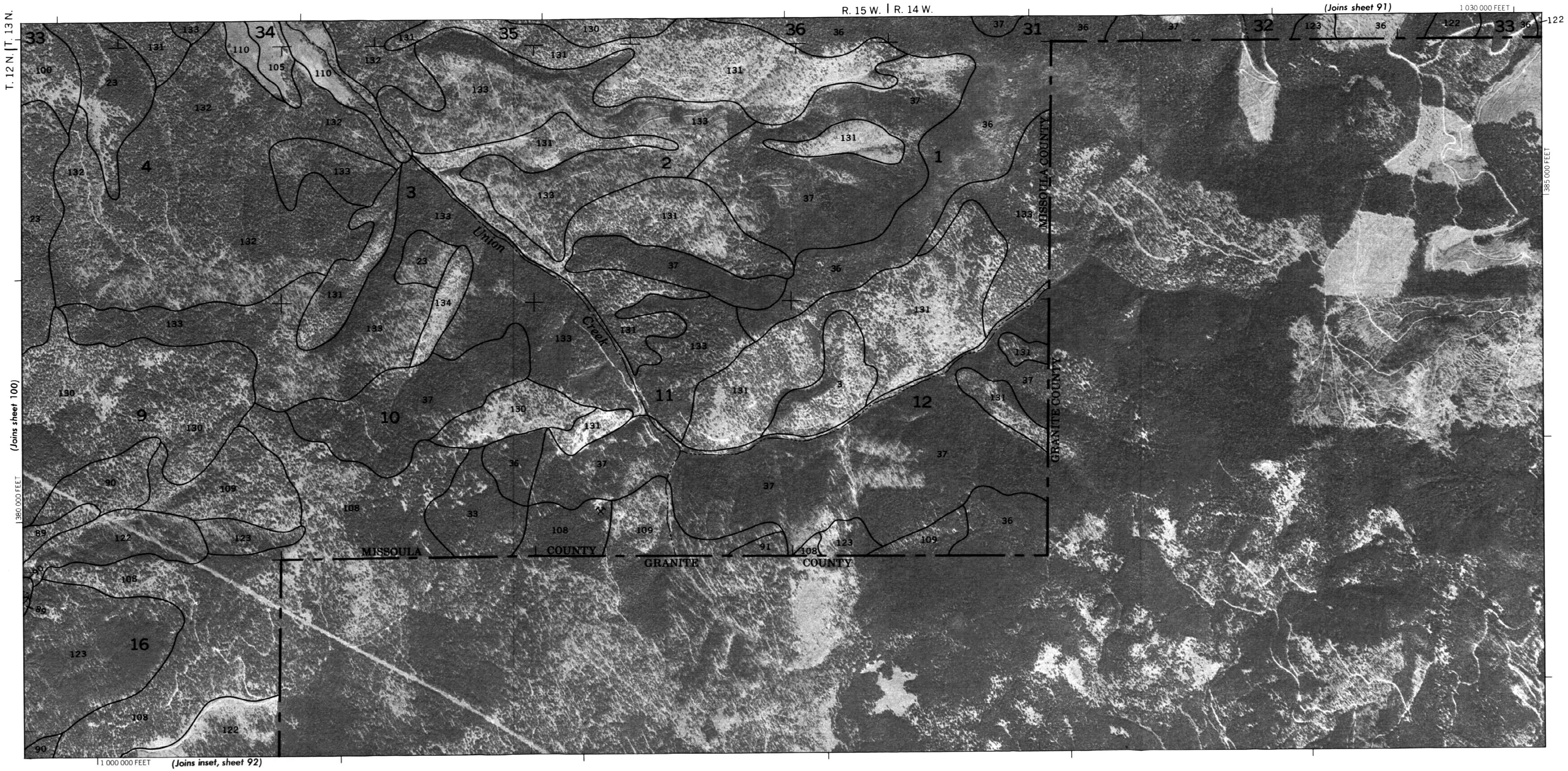
MISSOULA COUNTY AREA, MONTANA NO. 100

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 101



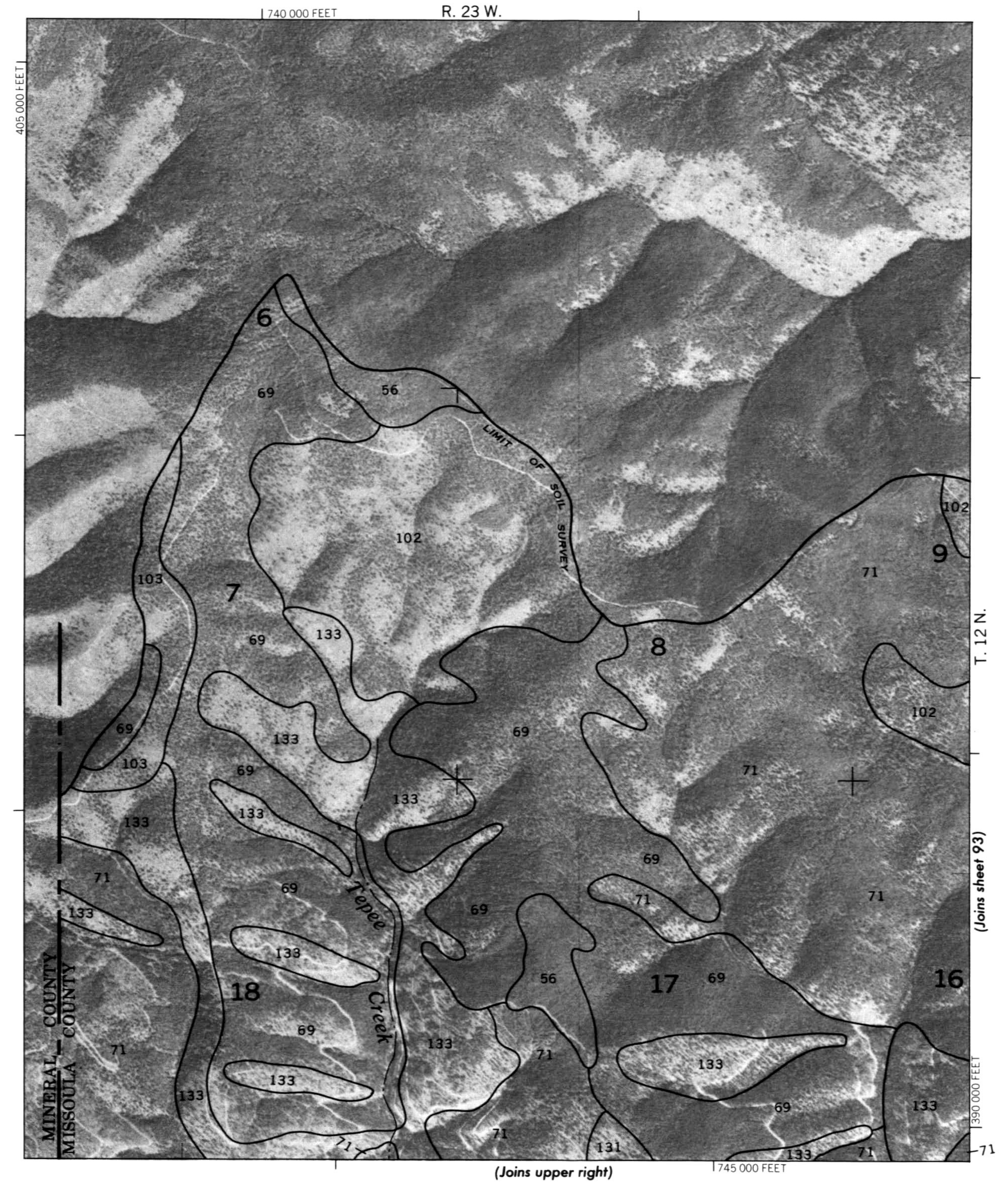
5000 4000 3000 2000 1000 0 5000 10000 Feet

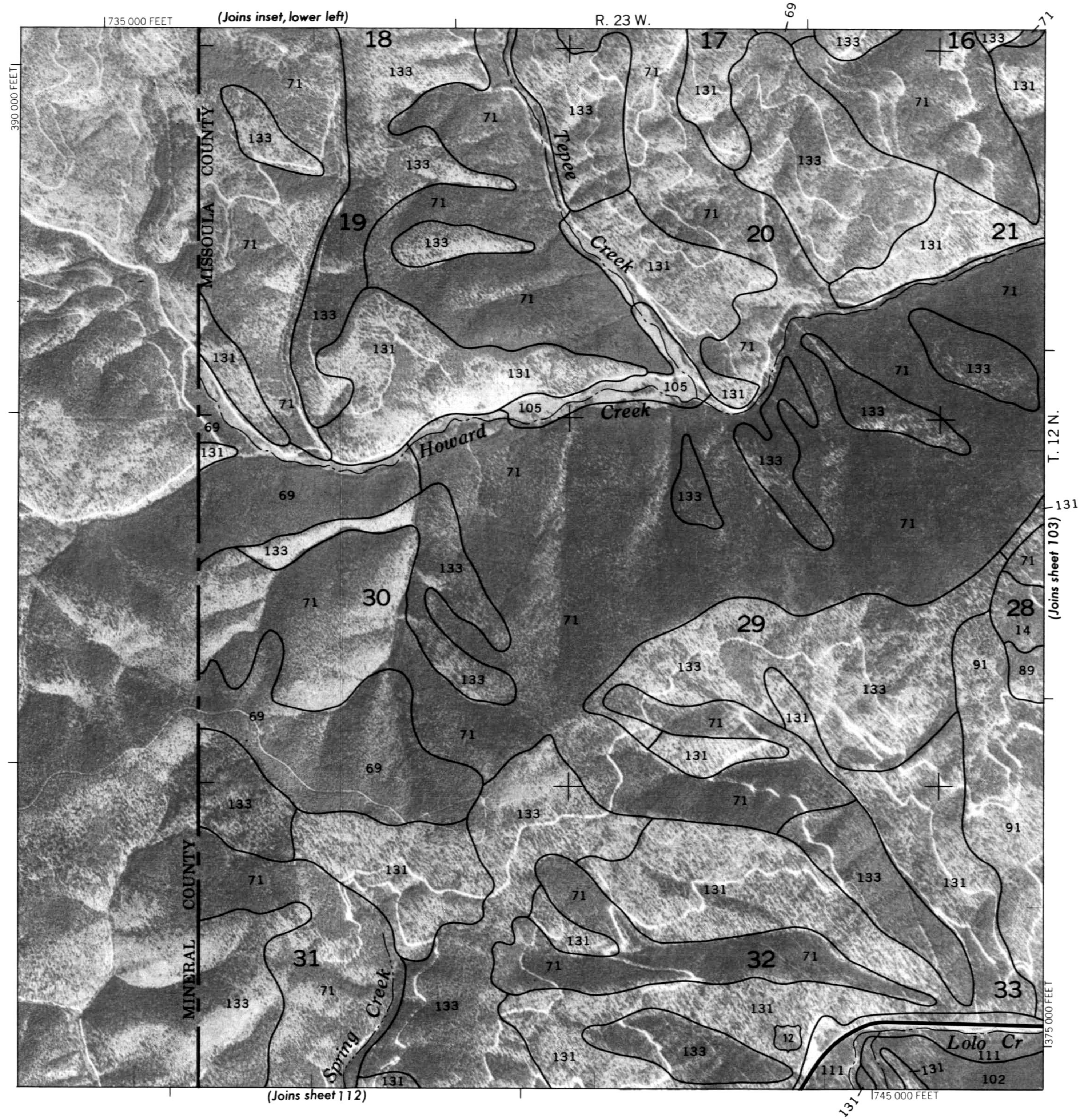
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

102

N





5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 102

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

103

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 103

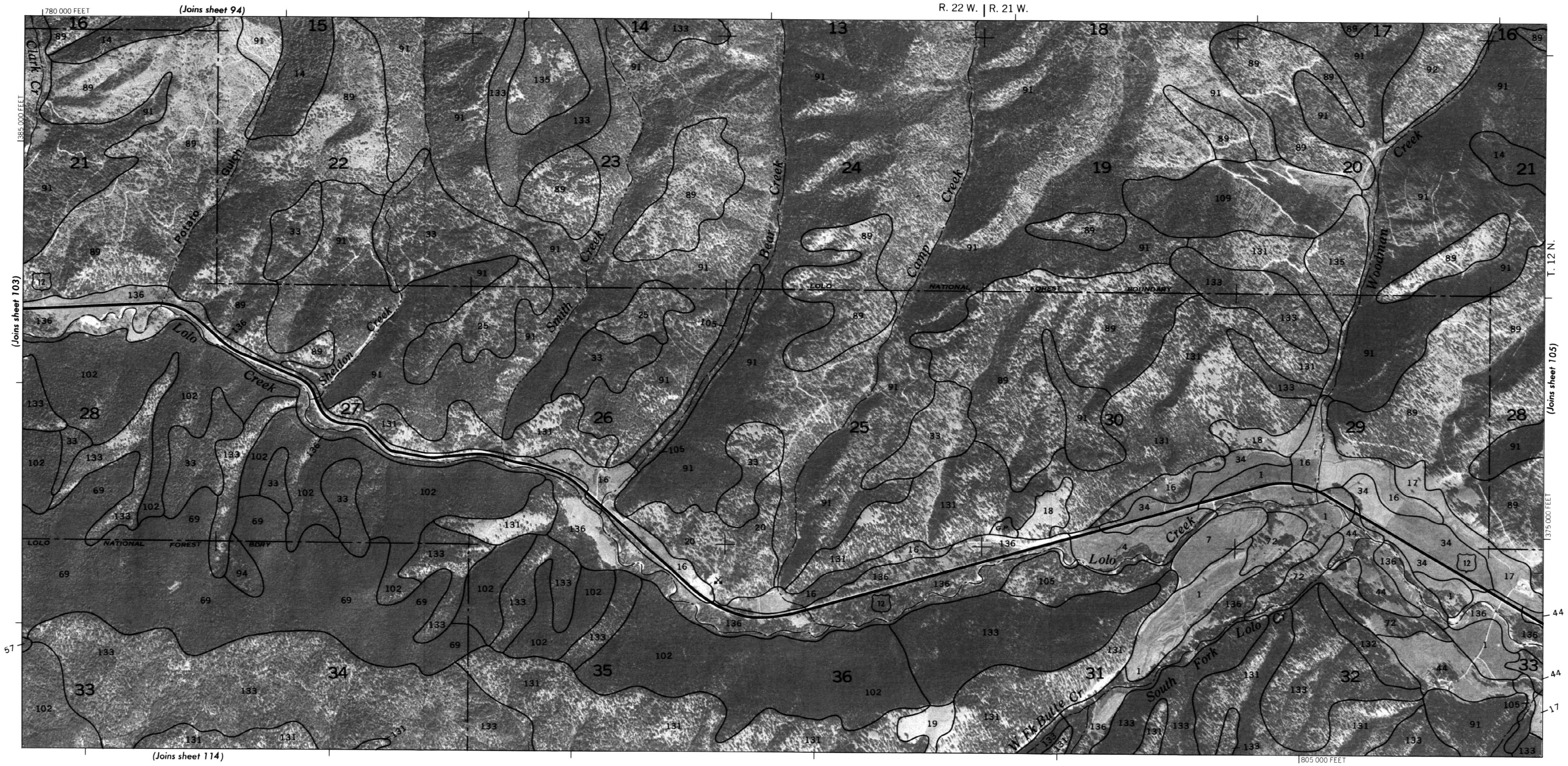
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 104



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 104

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

105

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 105

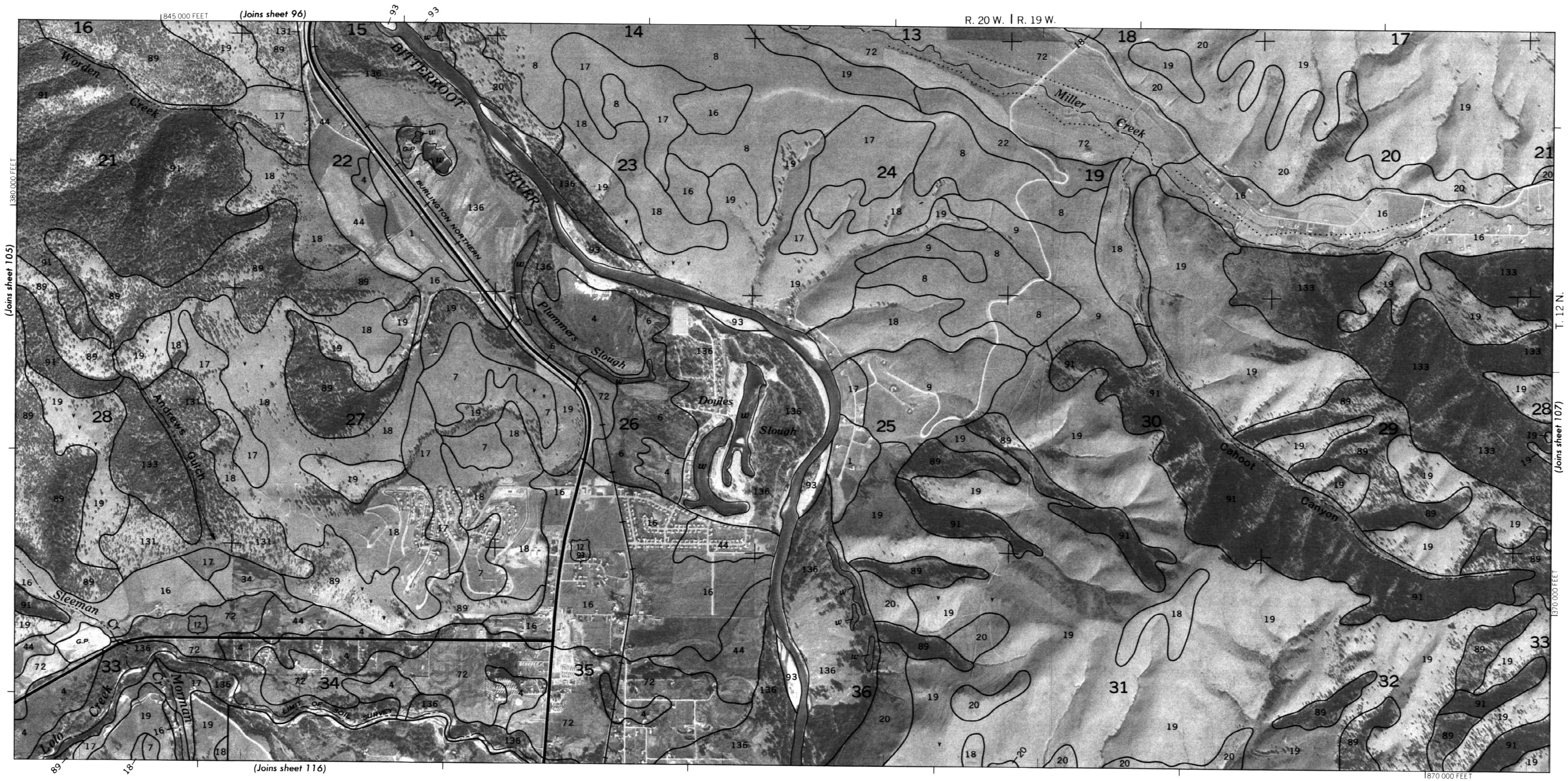
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 106



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 106

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 107

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 108

Scale - 1:24 000

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974-1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 109

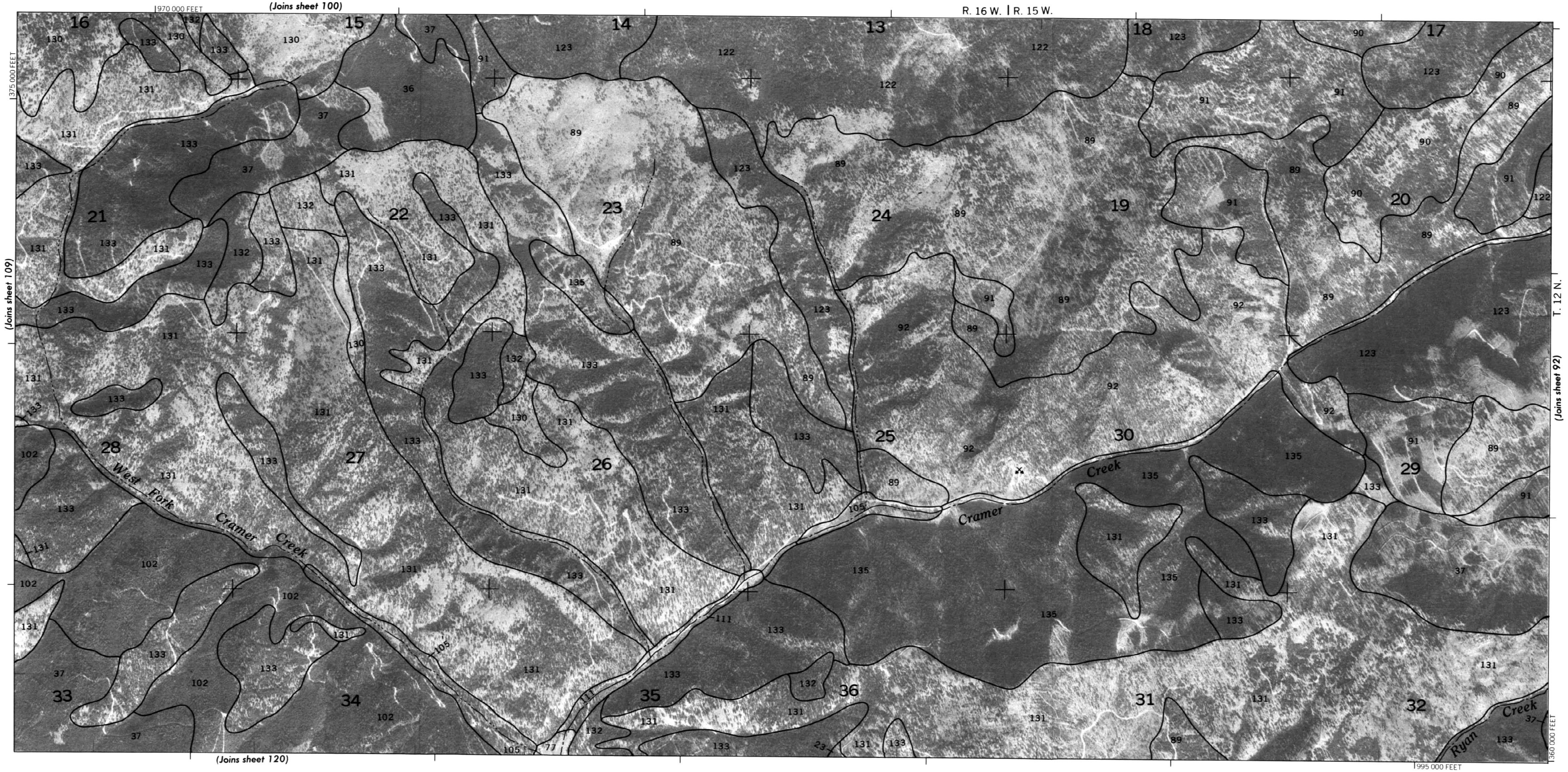
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 110



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

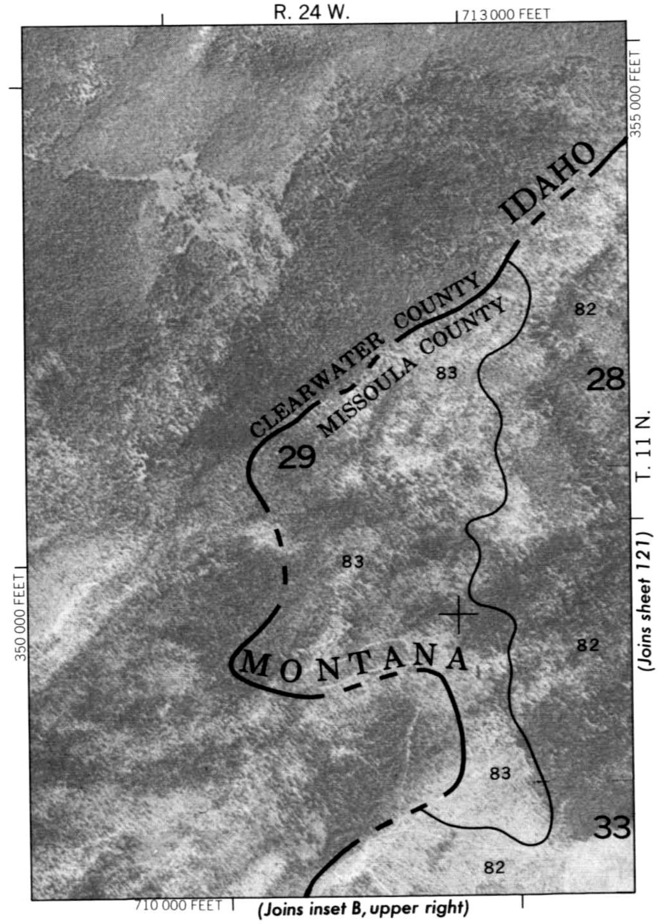
111

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 111

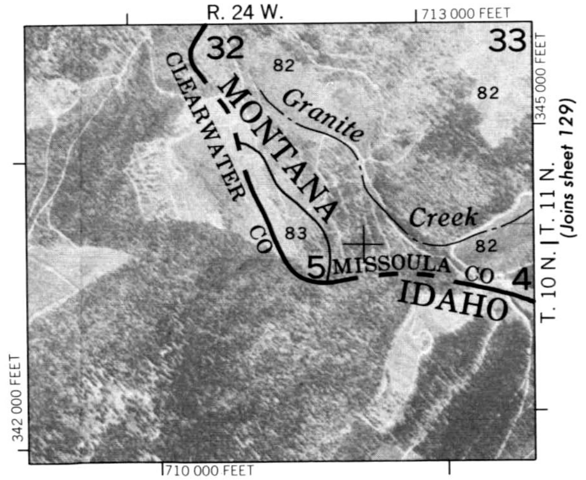
INSET A



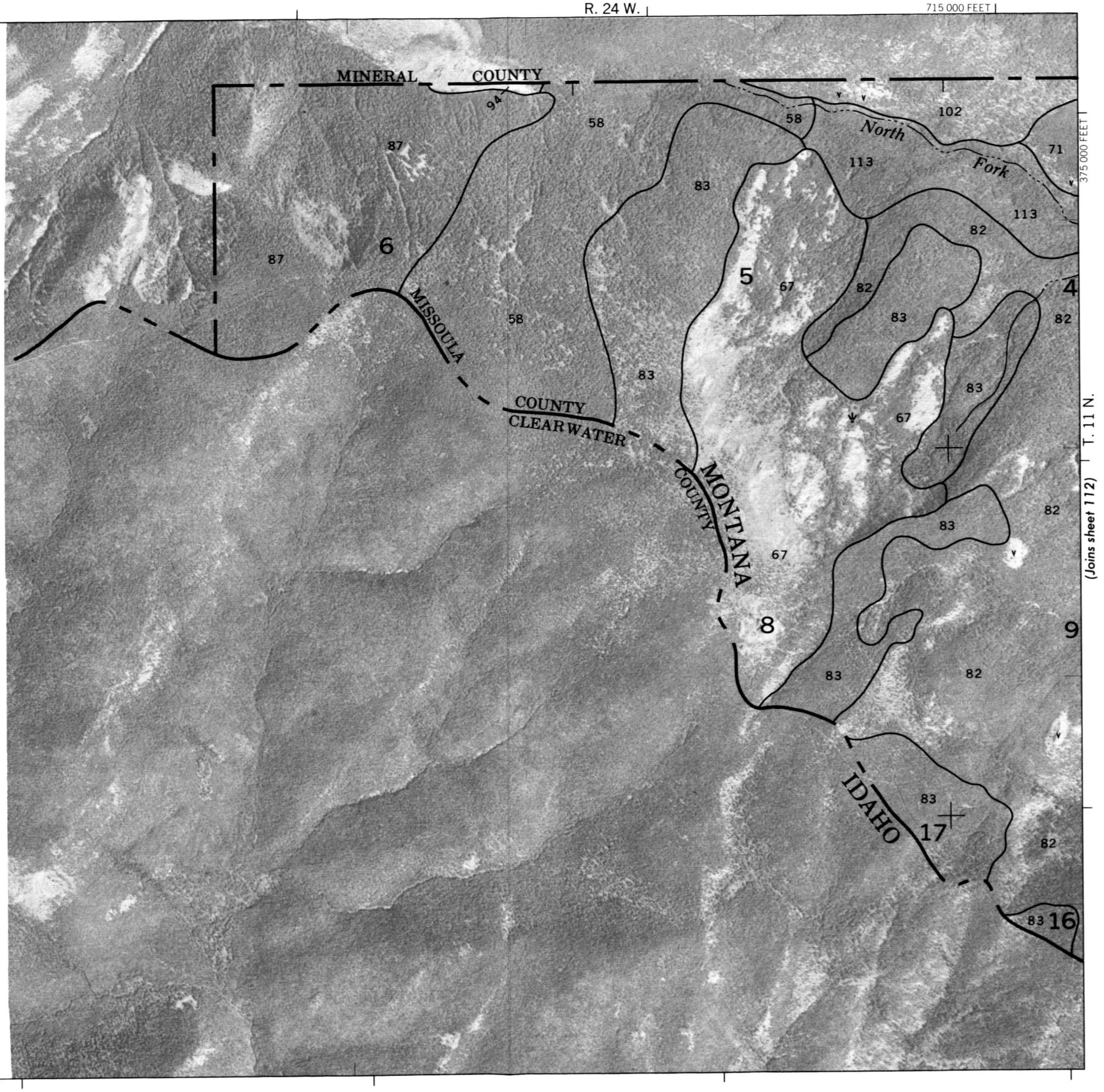
3000 AND 5000-FOOT GRID TICKS

INSET B

(Joins inset A, lower left)



3000-FOOT GRID TICKS



365 000 FEET

685 000 FEET

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 112

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 112

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

113

N

Scale - 1:24 000

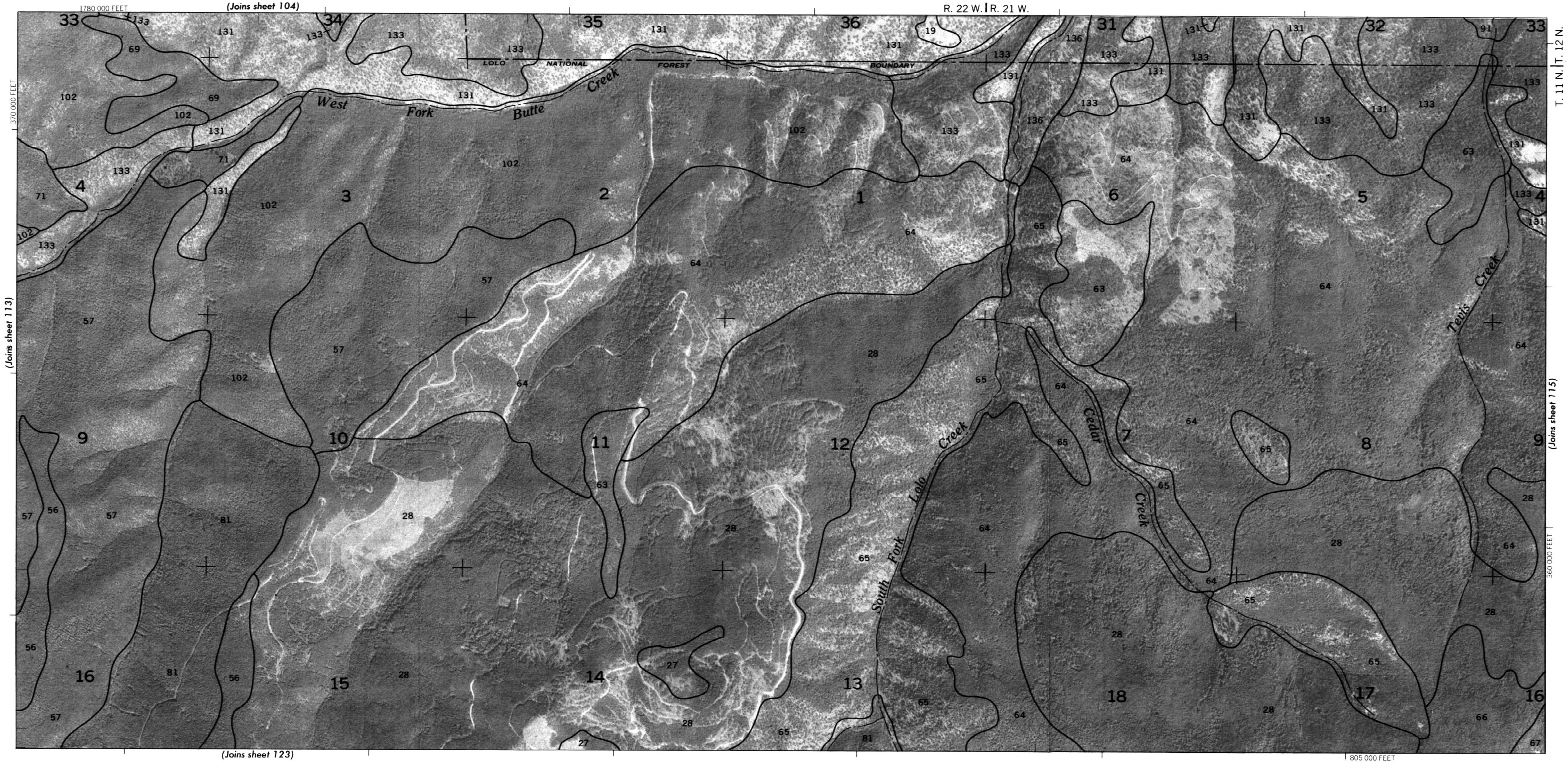
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 114



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 114

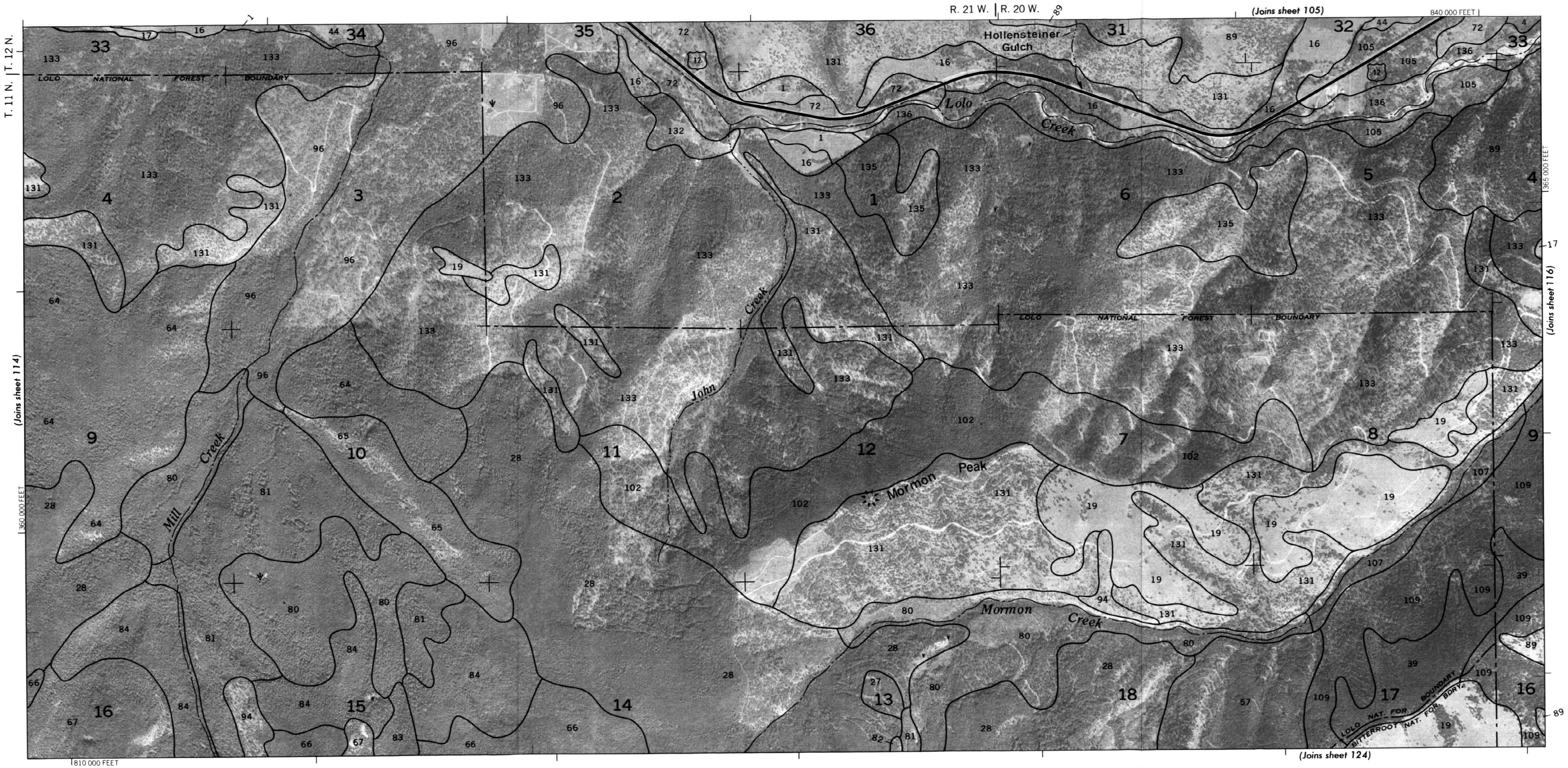
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

115

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 115

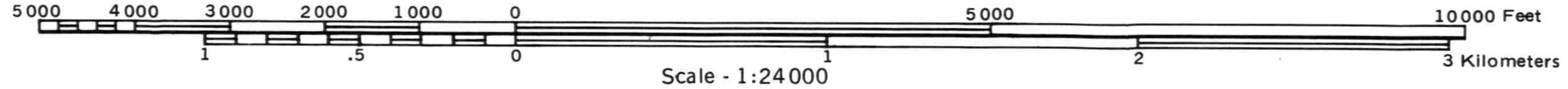


5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

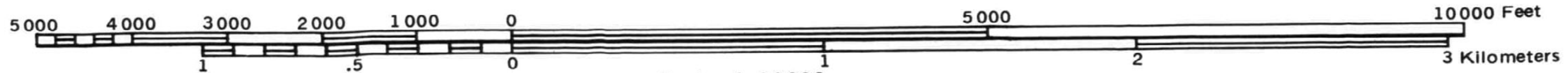
Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 116



MISSOULA COUNTY AREA, MONTANA NO. 116

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 117

118

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 118

5000 4000 3000 2000 1000 0 5000 10000 Feet

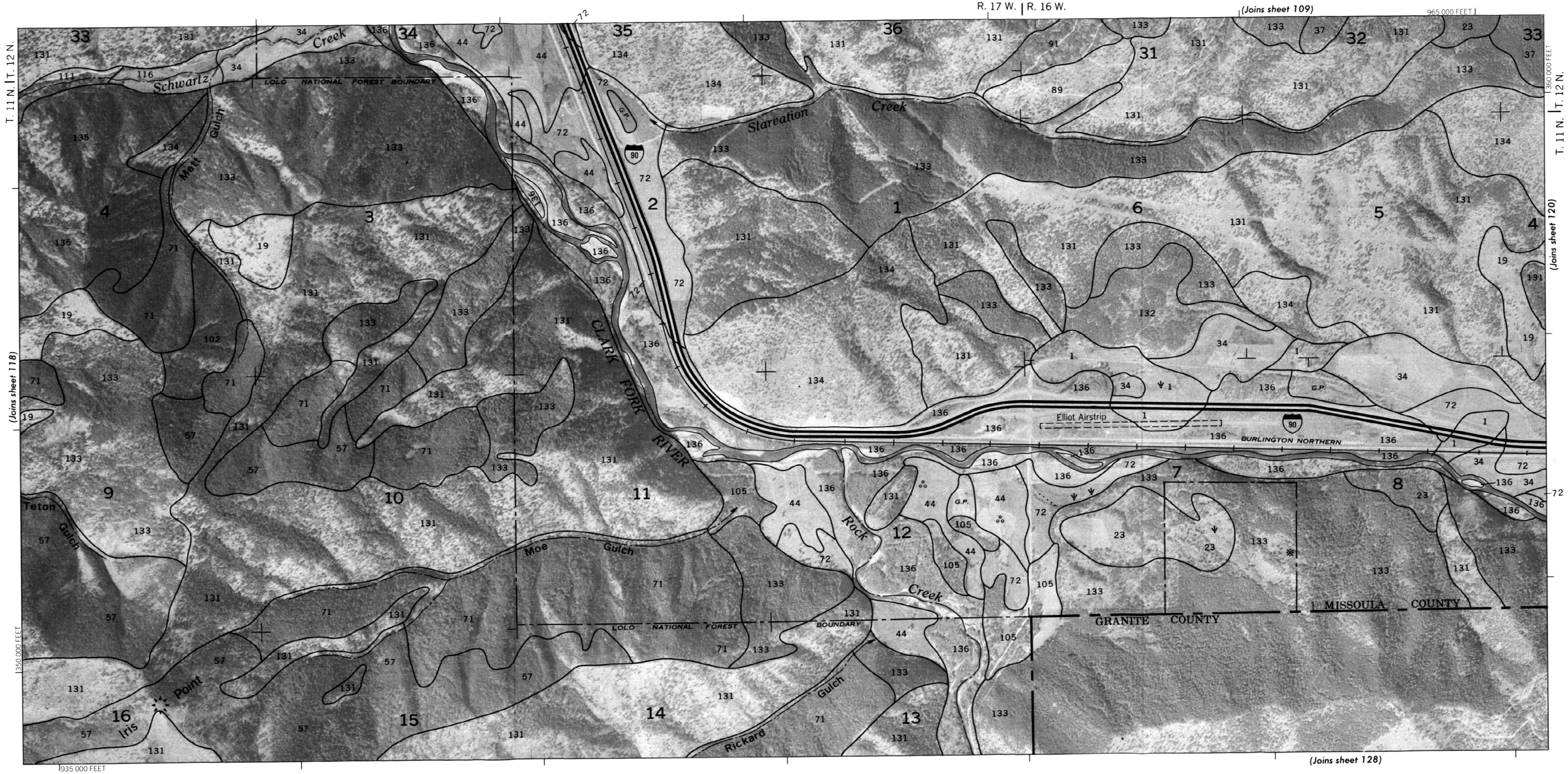
1 .5 0 1 2 3 Kilometers

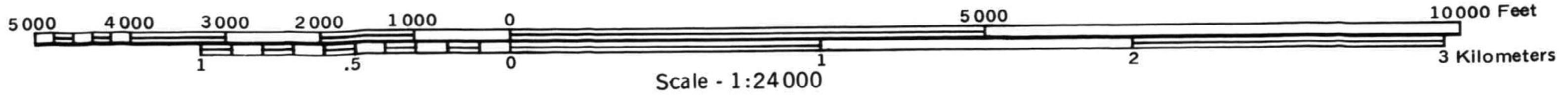
Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 118

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



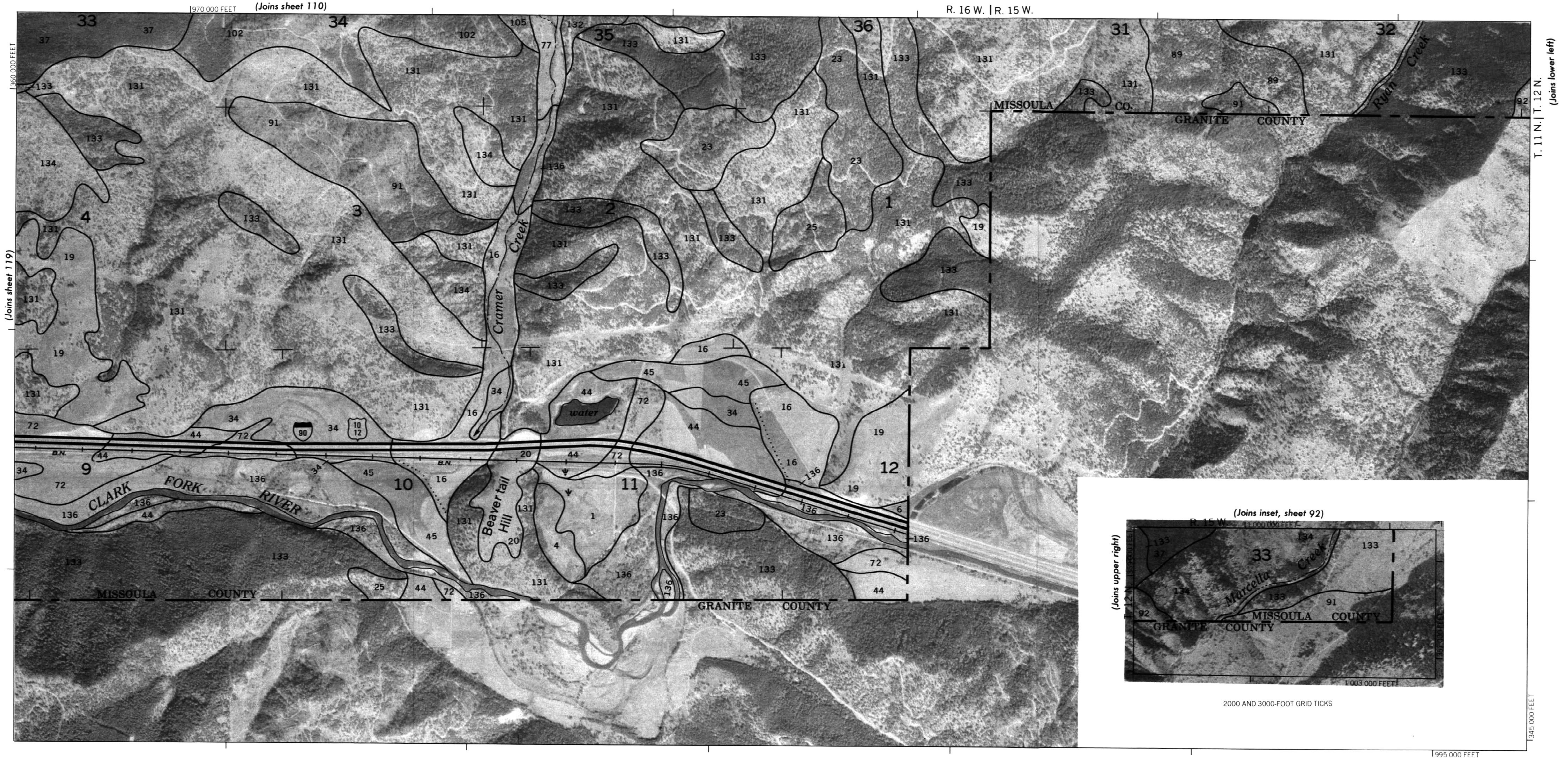


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 119

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 120



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 120

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

121

N

5000 4000 3000 2000 1000 0 5000 10000 Feet

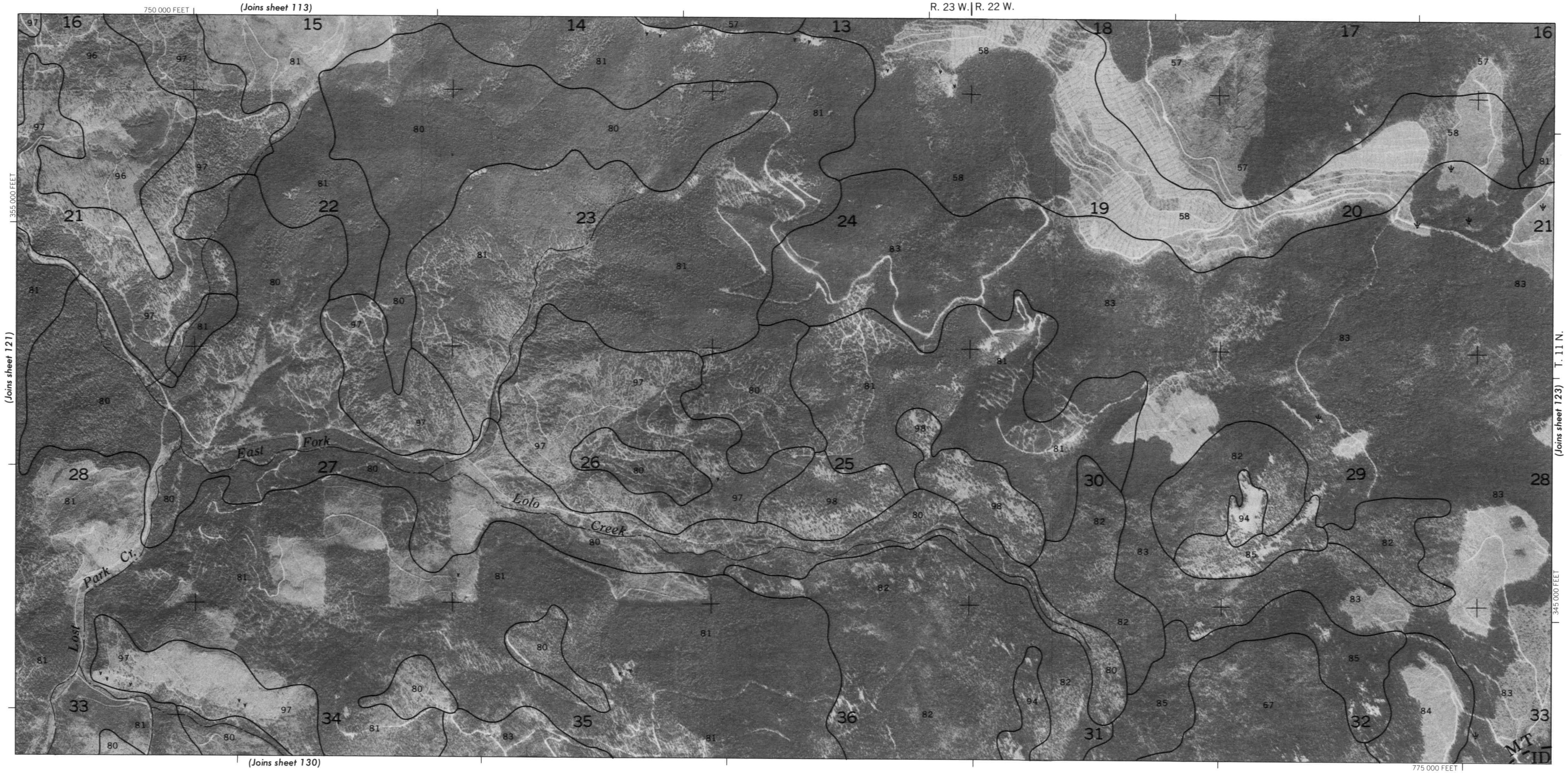
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

122

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

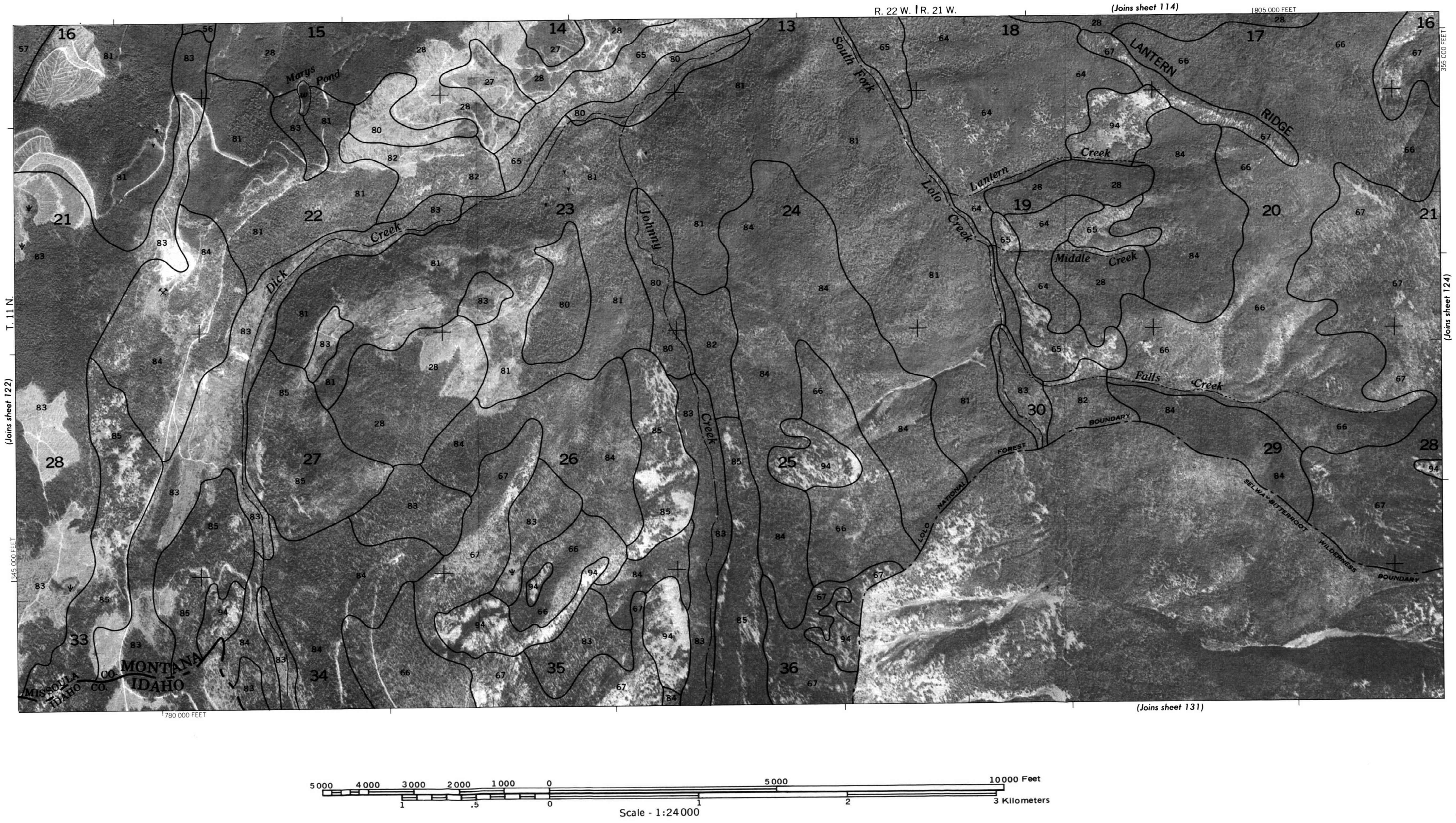
MISSOULA COUNTY AREA, MONTANA NO. 122

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

123

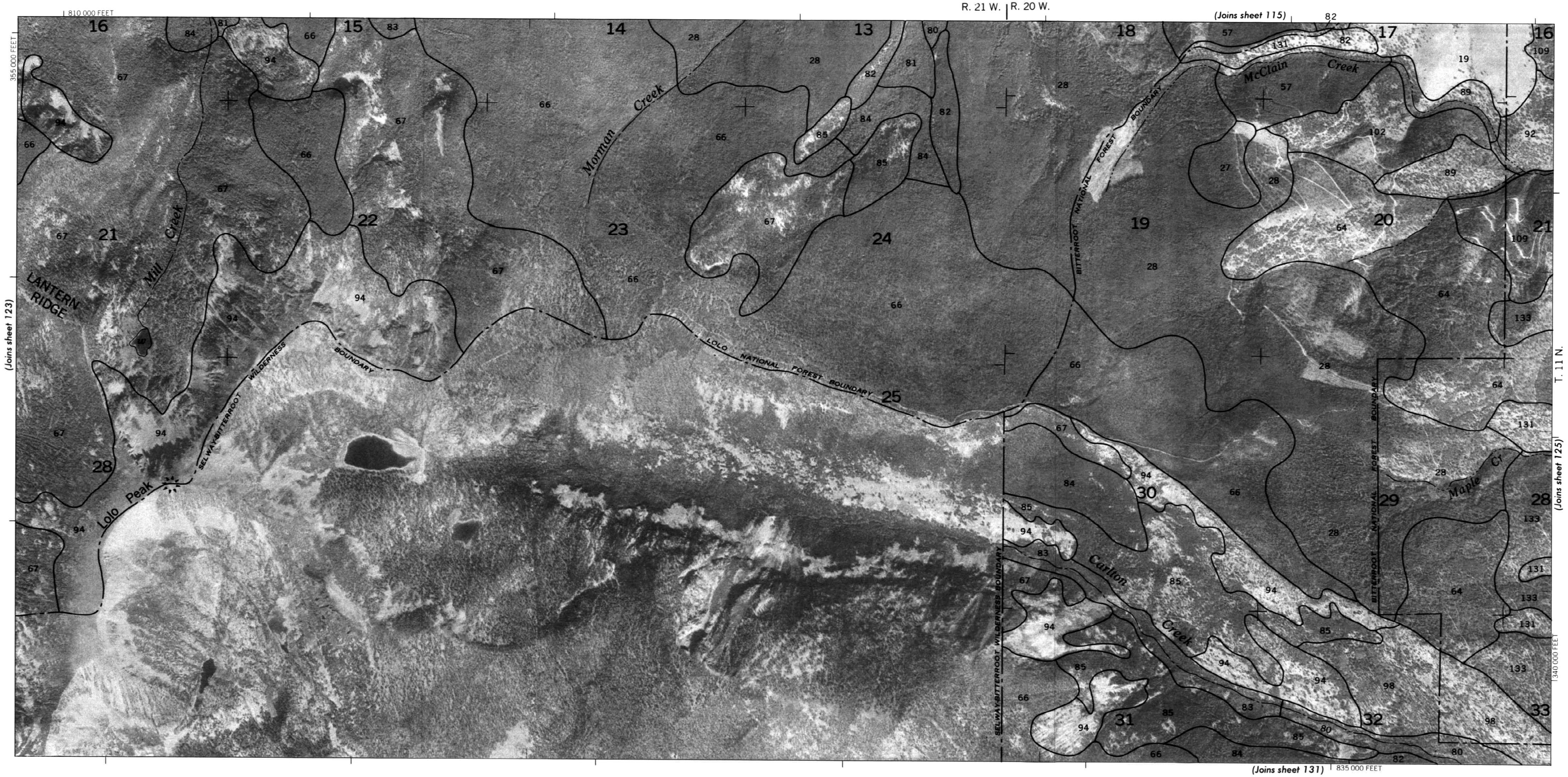
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

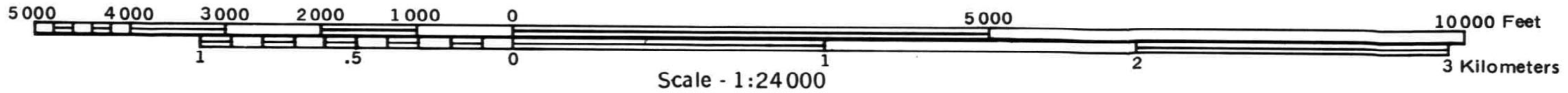
MISSOULA COUNTY AREA, MONTANA NO. 123



N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 124





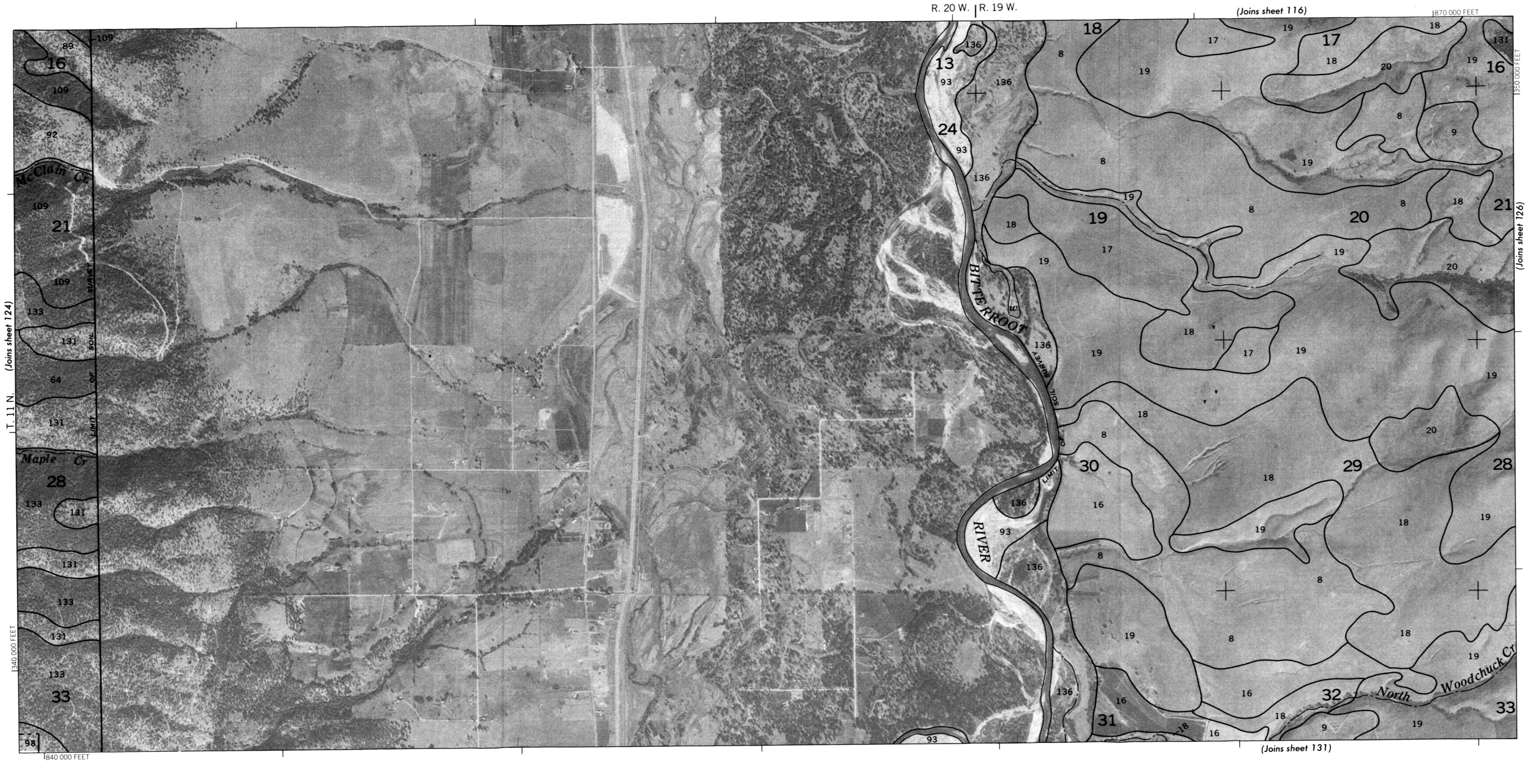
Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 124

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(125)

N



Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 126

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 126

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

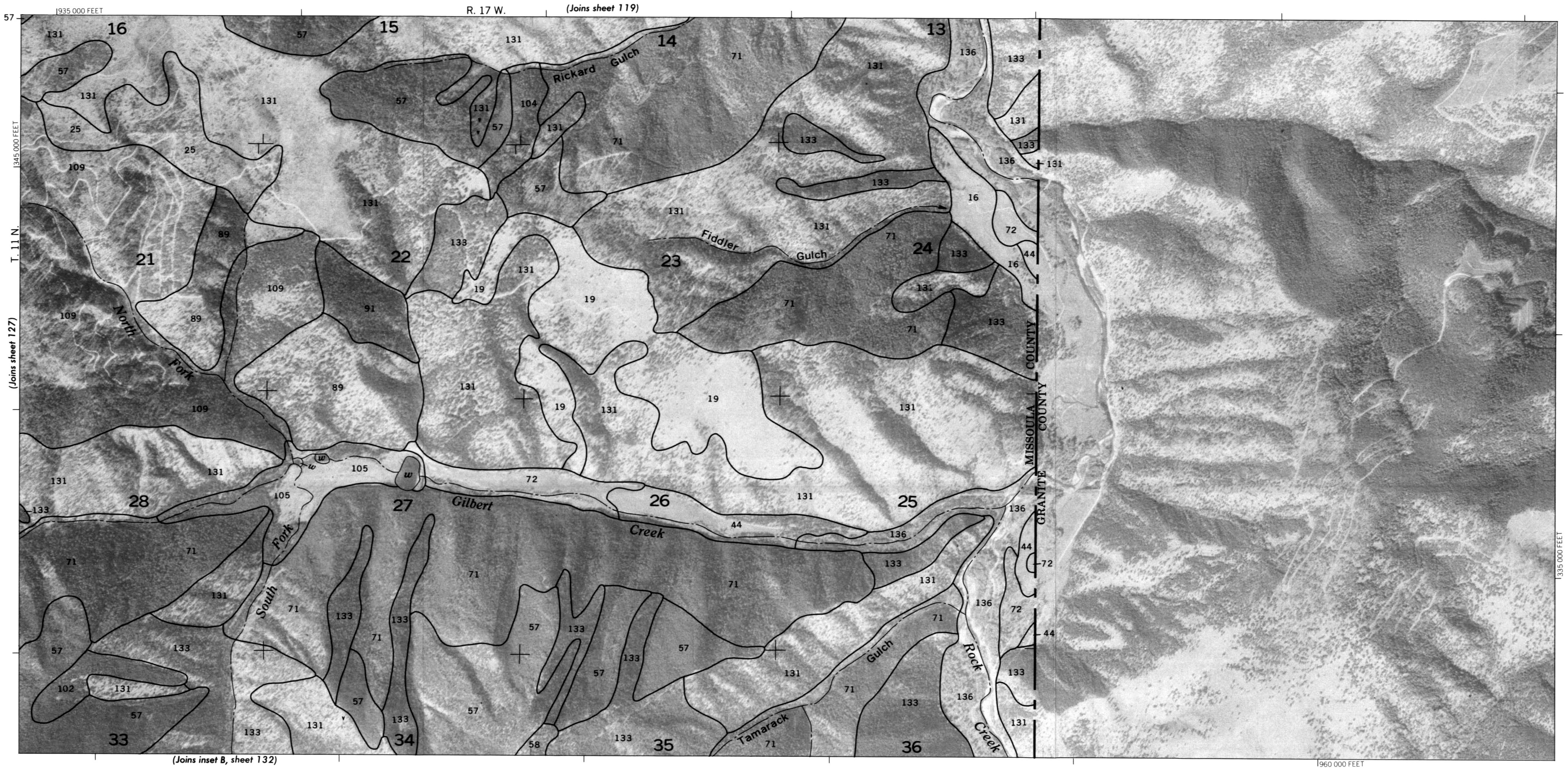
Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MISSOULA COUNTY AREA, MONTANA NO. 127

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 128



5000 4000 3000 2000 1000 0 5000 10000 Feet

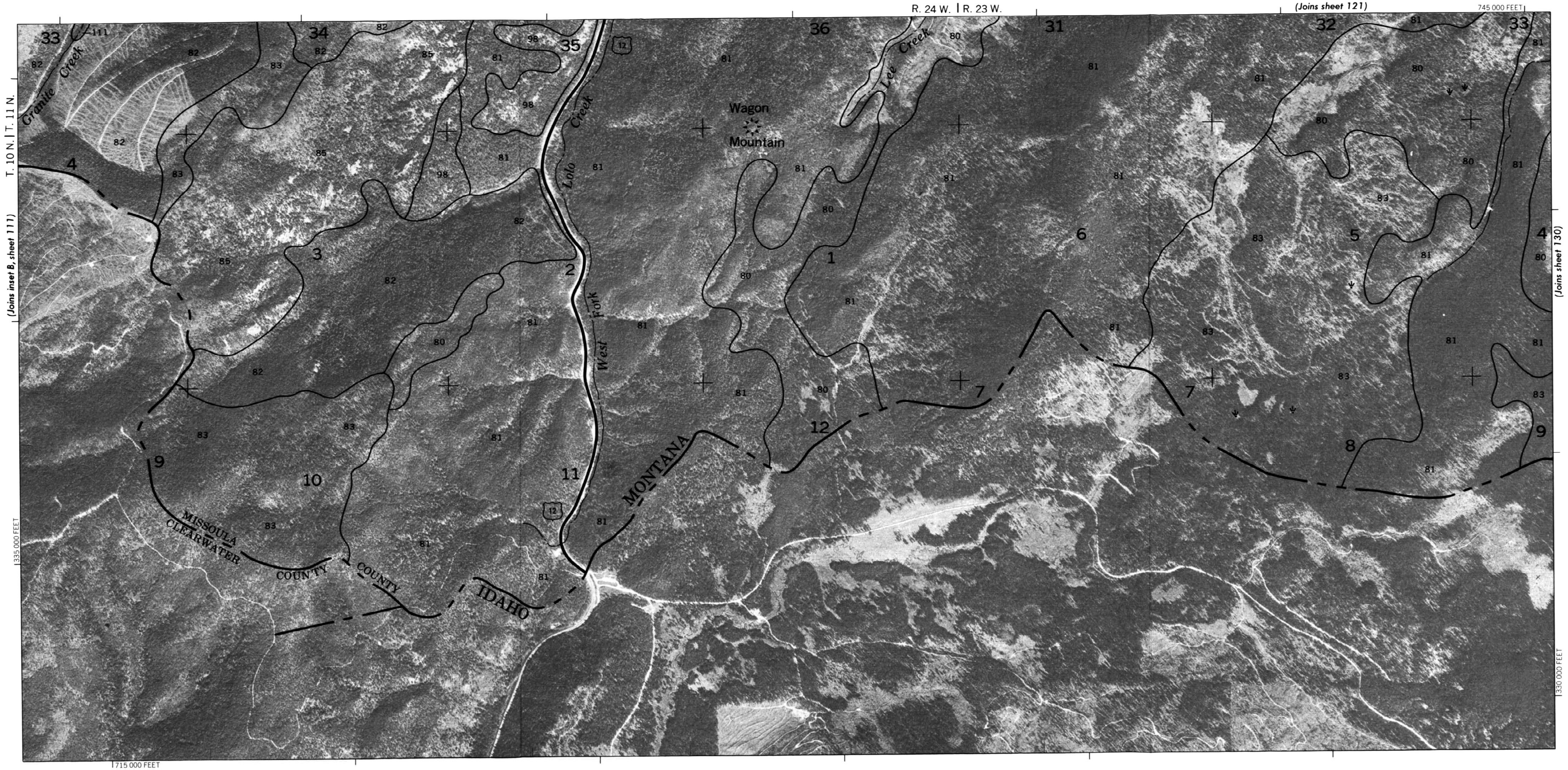
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 128

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

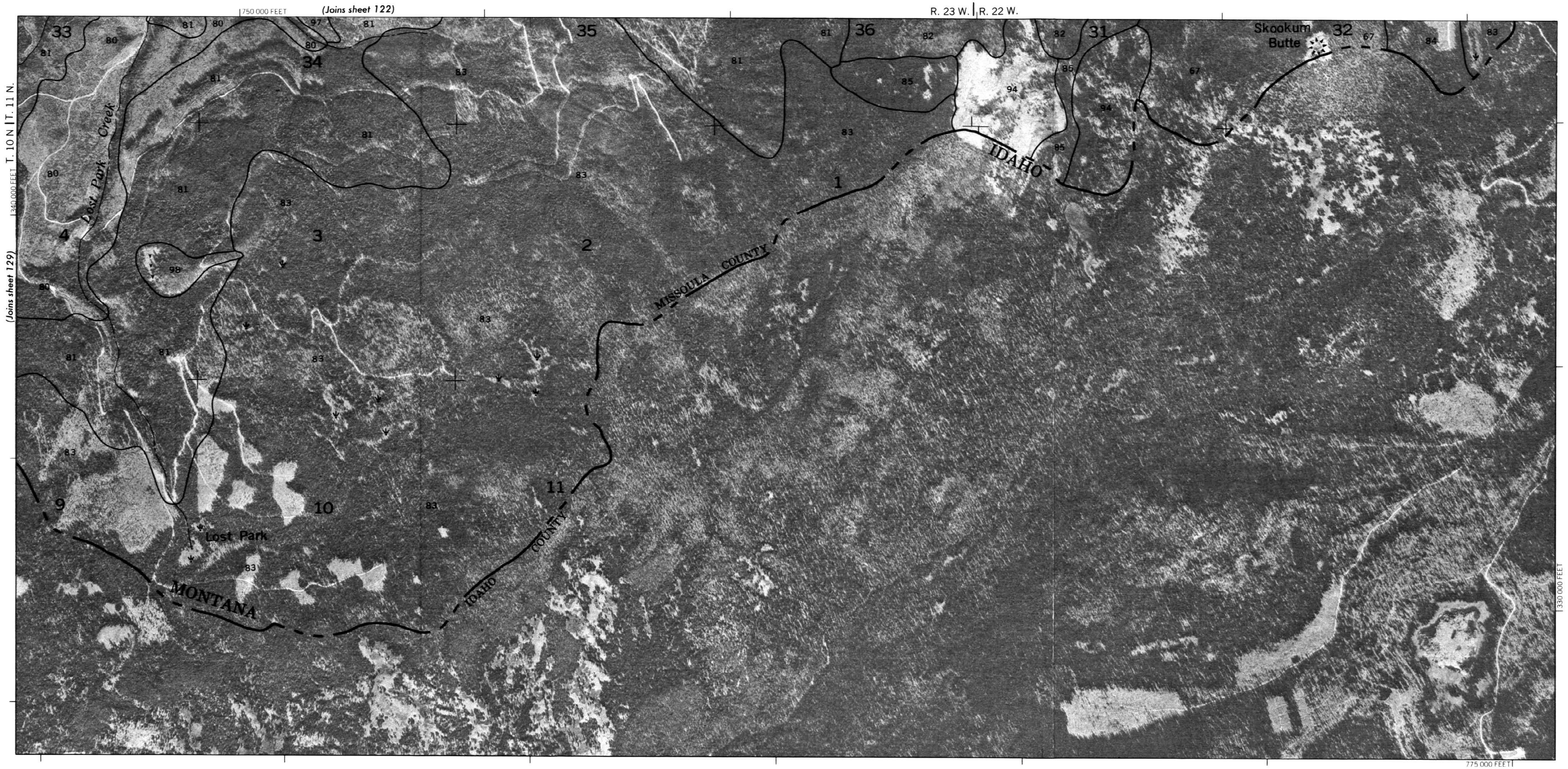
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MISSOULA COUNTY AREA, MONTANA — SHEET NUMBER 130



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

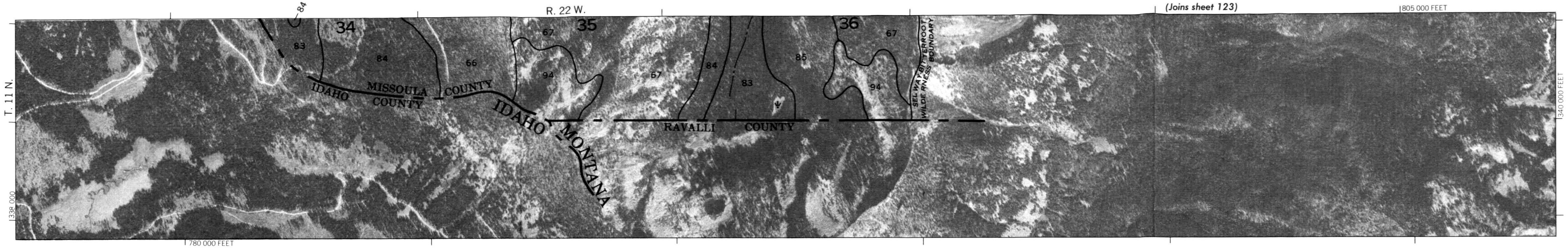
Scale - 1:24000

MISSOULA COUNTY AREA, MONTANA NO. 130

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 · 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

R. 22 W. (Joins sheet 123) 805 000 FEET

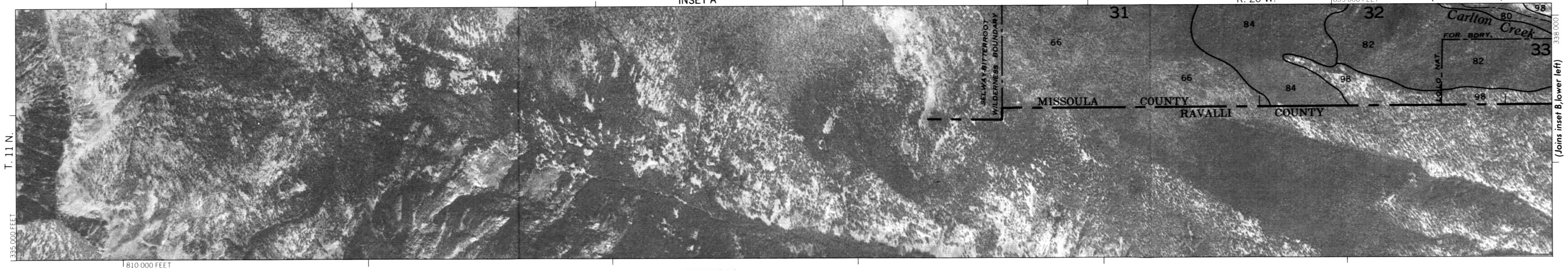


780 000 FEET

2000 AND 5000-FOOT GRID TICKS

INSET A

R. 20 W. 835 000 FEET (Joins sheet 124)



810 000 FEET

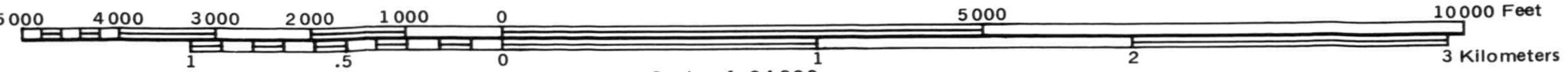
3000 AND 5000-FOOT GRID TICKS

INSET B

R. 20 W. | R. 19 W. (Joins sheet 125) 870 000 FEET

840 000 FEET

1000 AND 5000-FOOT GRID TICKS

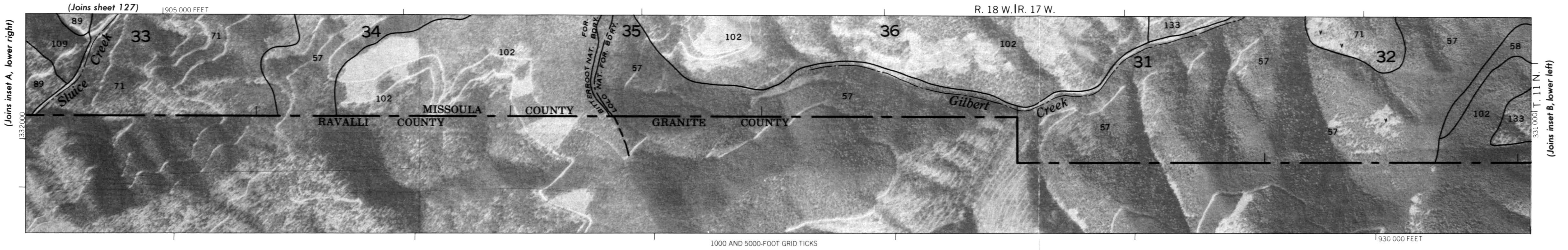


Scale - 1:24 000

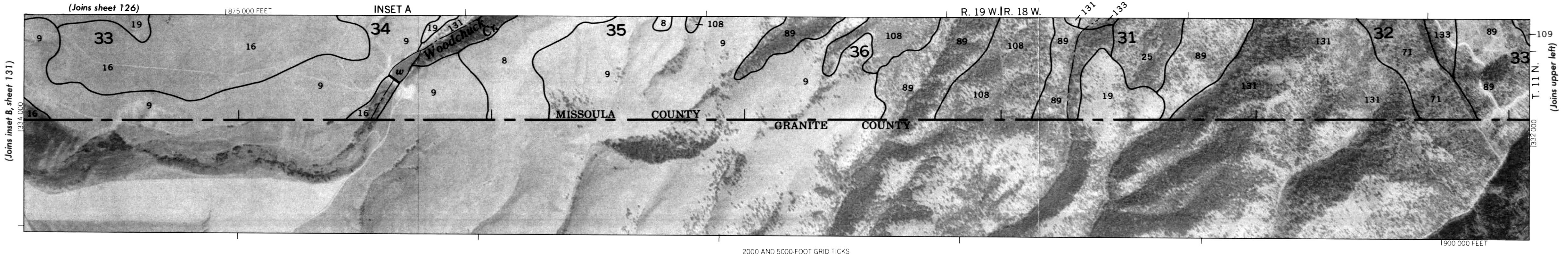
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

132

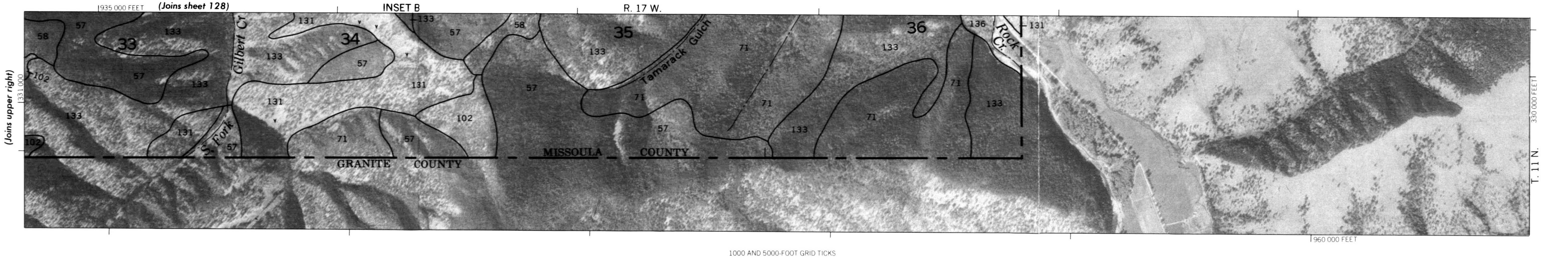
N



INSET A



INSET B



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

MISSOULA COUNTY AREA, MONTANA NO. 132

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1974 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.